

AGRICULTURAL CHEMICALS

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AGRICULTURAL INSECTICIDES • FUNGICIDES • STOCK DIPS AND SPRAYS
FUMIGANTS • DAIRY FARM CHEMICALS • WEED CONTROL CHEMICALS • FERTILIZERS
SOIL TREATING MATERIALS • SEED TREATING CHEMICALS • RODENTICIDES

July, 1948

Number 7

Volume III

For
MAXIMUM SPRAY DEPOSITS
Use
"ORCHARD BRAND"



Orchard Brand Spray Materials
for the Fruit Grower include:

GENITOX* S 50

Micro-particle 50% wettable DDT powder,
for many insects attacking fruits.

ASTRINGENT & STANDARD LEAD ARSENATE

The nation's leading "Leads."

G-6 BHC WETTABLE SPRAY POWDER

For over-wintering and first-brood curculio. To be used only
according to recommendations of local authorities.

NICOTINE SULFATE

For aphid and pear psylla.

GENITHION[†]

Contains Parathion, for mite control.

MICRO-DRITOMIC* SULFUR

With particles of true micron fineness,
for apple scab and peach brown rot.

DRITOMIC* SULFUR

Peach growers' standby, for brown rot and scab control.

SPRAYCOP*

Highly stable neutral copper fungicide,
for copper responding fungous diseases.

* Reg. U. S. Pat. Off.

† General Chemical Trade Mark

Smooth, unbroken spray covers on fruit and foliage
mean better insect and disease control. They "pay off" in cleaner, better fruit at picking time.

To the commercial fruit grower, it is a foregone conclusion that the protection of his orchard against insect and disease damage, calls for spray materials that have the best possible "killing wallop" built into them. But along with this, the spray materials must possess still another important quality: maximum covering ability. The spray deposit on fruit and foliage must be smooth and uniform, with minimum loss of the insecticide or fungicide in the spray runoff. Only then can the grower be sure of having the important extra measure of spray protection that means more of the "money fruit."

Every spray material General Chemical produces is carefully developed to meet all of these requirements. Before it can be offered to growers, its covering qualities, as well as its insect or disease control effectiveness and all-around spray efficiency, must be proven through research in the laboratory and in the field. Only then can a product bear the Orchard Brand trade-mark.

GENERAL CHEMICAL DIVISION

ALLIED CHEMICAL & DYE CORPORATION

40 Rector Street, New York 6, N. Y.

Offices Serving Principal Agricultural Centers Throughout The Nation



Quality and Service

You are assured on two important points—even in today's abnormal market—when you deal with P. C. A.

1. Quality . . . our Red Indian products are of unquestioned excellence.
2. Service . . . we make every effort to give you the service you want and deserve.

When better service is possible be assured P. C. A. will give it. Meanwhile your confidence, and your patience are greatly appreciated.

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ATTACLAY'S DOING A

Top Flight JOB

That's what plane-dusters are saying about Attaclay-extended materials. And it's a timely tip-off to blenders who mix the dusts for the "hedge-hoppers" to lay down.

What they like most of all is the steady, free "slip" of Attaclay-diluted dusts from their plane's feed hoppers and nozzles. Each swing down the field becomes a one-way trip, with no doubling back to pick up void spaces in the pattern. The time and materials thus saved add up to real money.

Attaclay has other diluent features that plane-dusters want. Its low bulk density suggests greater coverage per pound of finished dust. Yet, despite its favorable bulkiness, the size and shape of Attaclay's particles promote a proper rate of fall. The result is more even coverage—more uniform deposit.

Attaclay adheres to the host foliage. Moreover, its compatibility with the variety of plane-applied toxic agents demanded by growers is well proven.

Knowing what your customers like and want is handy information. With Attaclay as one of the important answers, let's get together now for your summer dust needs.

ATTAPULGUS CLAY COMPANY

Dept. P, 210 West Washington Square, Philadelphia 5, Pa.

PHOTO—S. S. SPFF, AGRI.



AGRICULTURAL CHEMICALS



A Monthly Magazine
For the Trade

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THIS MONTH'S COVER

New insecticides are being developed continually to control specific insect pests. Here a new material is being dusted on tomato plants by the U. S. Department of Agriculture for complete data on the preparation. (Photo courtesy U. S. Department of Agriculture.)

JULY 1948
VOL. III No. 7

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Dr. Vex in Bugland

Ahhhhh
THERE'S GOOD NEWS TONIGHT



-AND NOW THE WEATHER
BROUGHT TO YOU BY
WEEVIL WEEVIES-TOMORROW
WARM AND HUMID!



WESTVACO 3-5-40 COTTON DUST
works magic in killing cotton insects
-and building profits for
insecticide distributors.

TO HELP YOU get business right thru the season Westvaco has spot warehouse stocks of 3-5-40 Cotton Dust at Houston, Texas; Greenville, Miss.; Dothan, Ala. and Columbia, S. C.

OVERNIGHT BY TRUCK to anywhere in the Cotton Belt, Westvaco Spot Stocks are one more good reason for lining up with Westvaco for all your needs on all the agricultural insecticides listed below.

BUT REMEMBER: first come, first served. At the peak of the season, spot stocks can disappear quickly. Get in touch with us by letter or phone to open warehouse-credit at any of the points mentioned above. Don't delay—act today!



AGRICULTURAL CHEMICALS DIVISION

WESTVACO CHEMICAL CORPORATION

EXECUTIVE AND GENERAL OFFICES • 405 LEXINGTON AVENUE, NEW YORK 17

FOSVEX* (40% Tetraethyl Pyrophosphate)

DEVEX "T"** (DDT Technical)

DEVEX D-50* (30% DDT Dry Dust)

DEVEX W-50* (50% DDT Wettable Dust)

TRIVEX "T"** (Benzene Hexachloride Dry Dust)

TRIVEX D-50* (30% Benzene Hexachloride Dry Dust)

TRIVEX W-50* (40% Benzene Hexachloride Wettable Dust)

3-5-40 Cotton Dust

(3% Gamma Benzene Hexachloride, 5% DDT,
and 40% Sulfur)

SOILFUME 60-40* and 80-20*

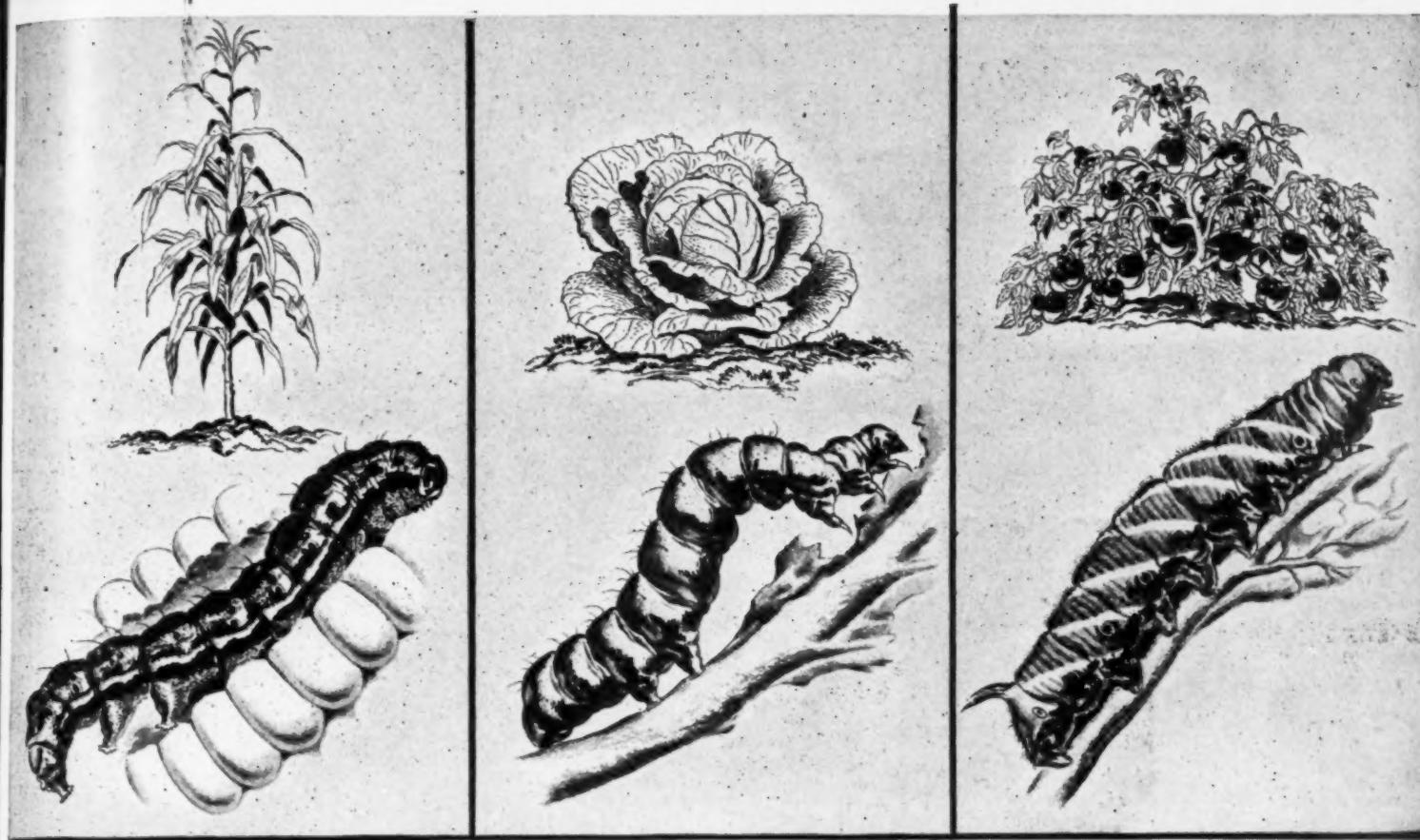
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(Ethylene Dichloride-Ethylene Dibromide Mixtures)

METHYL BROMIDE





RHOHANE KILLS THESE CROP DESTROYERS...
IS 8 TIMES SAFER TO USE THAN DDT!

GROWERS want dusts that are effective and safe. RHOHANE (DDD) has proved generally as effective as DDT against most pests of crops and livestock — yet is *8 to 10 times less toxic* to warm-blooded animals!

California reports RHOHANE (DDD) more effective than DDT against tomato horn worms. New Jersey makes the same report on corn earworms. And in the cattle country, RHOHANE is proving just as effective as DDT in combatting flies, lice, and ticks. But even more important to you and your customers is the 8- to 10-fold *greater safety* of RHOHANE which means less residue hazard.

Here are *facts* that make RHOHANE-formulated dusts more popular and profitable. For bigger sales and more satisfied customers, get the full story of RHOHANE today.

RHOHANE is a trade-mark, Reg. U.S. Pat. Off.

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FOR YOUR INFORMATION

Wisconsin tests prove Nifos-T best for pea aphid control



Recent tests conducted in Wisconsin have demonstrated the outstanding effectiveness of Nifos-T (Monsanto Tetraethyl Pyrophosphate, Technical) in controlling pea aphids.

Nifos-T and seven competitive insecticides were applied to six plots of peas by power duster at the rate of about 35 pounds per acre. Nifos-T yielded by far the best results of all materials used. A 2½% formulation killed 96% of the aphids—even when heavy rainfall occurred immediately after the dusts were applied.

The quick-killing power of Nifos-T extends to a wide variety of aphids, mites, thrips and other destructive insects. Furthermore, Nifos-T does not give rise to problems in residual toxicity. Formulators and processors are invited to send for complete application and technical data. Write to Monsanto, Organic Chemicals Division, or return the coupon, indicating the information you desire.



How do you stand on next year's requirements?

Monsanto now has expanded production of 2,4-D Acid, 2,4-D Sodium Salt and 2,4-D Isopropyl Ester. This is of particular interest, since present indications are that 2,4-D will be used in greater quantities for weed control next year. Formulators are urged to contract early to insure against shortages such as were experienced last season.

Formulators and processors are also invited to send for a new Monsanto bulletin on 2,4-D, containing helpful application and technical data. For your copy, write to Monsanto, Organic Chemicals Division, or simply note your request on the coupon.

Safety Suggestions

Careful use of 2,4-D formulations will result in effective weed control. Of the few simple safety precautions to be observed, the most important are: USE THE RIGHT FORMULATION; DO NOT APPLY IN A HIGH WIND. This will safeguard ornamental and crop plants. Manufacturers and formulators should make every effort to impress users with these vital precautions—by proper labeling and explicit handling instructions.

News of Monsanto Chemicals for Insecticides, Herbicides and Fungicides July, 1948

Chinch bug, *Blissus leucopterus* Say.
Approximately 13 times natural size.
Preys on small grains and corn.



SANTOBANE (MONSANTO DDT)

Santobane (Monsanto DDT), when properly formulated and applied, will protect farm profits against the ravages of field-crop insects such as the chinch bug.

Santobane is effective when used in dusts, wettable powders, solutions, emulsifiable solutions and aerosols — for the control of insects in all four major groups: household, premise, agricultural and animal.

A new 28-page book, "Santobane, Monsanto DDT," contains valuable information for manufacturers and formulators of insecticides. Write to Monsanto's Organic Chemicals Division for your copy — or ask for it on the handy coupon.

Santobane: Reg. U. S. Pat. Off.

What is a good germicide?

By definition, a good germicide must be highly effective in killing germs. Santophen 7 not only accomplishes this, but meets many other important practical requirements as well. It is non-staining; can be readily formulated; is effective in the presence of organic matter; is comparatively non-toxic and, in use-dilutions, is non-irritating to man and the higher animals; is general in its germicidal effect (not merely specific toward certain microorganisms).

Reasonable in cost, Santophen 7 possesses other desirable properties, such as faint but pleasing odor, freedom from corrosive action on metals, stability. In addition to meeting the requirements for modern disinfectants, Santophen 7 can also be used to advantage as an industrial preservative and algicide.

For complete application and technical data, write for a copy of Monsanto Technical Bulletin O-3, "Santophen 7, a Germicide and Industrial Preservative." If you prefer, simply note your request on the coupon.

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MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri. District Sales Offices: New York, Philadelphia, Chicago, Boston, Detroit, Cleveland, Akron, Cincinnati, Charlotte, Birmingham, Houston, Los Angeles, San Francisco, Seattle, Portland. In Canada: Monsanto (Canada) Limited, Montreal.



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Name _____ Title _____

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You can still fill a bag with a shovel!

But why do it?

Most fertilizer manufacturers know that the modern, efficient way to fill bags is by a St. Regis Packaging System. That means St. Regis packers teamed up with the valve paper bags designed for them — St. Regis multiwalls. No two men agree on what fertilizer is. But thousands agree that, whatever it is, the way to pack it is in paper!

A St. Regis packer, teamed with St. Regis multiwalls, speeds production and cuts container costs. And the operation is handled by one man.

Customer reaction to paper bags is fine. Farmers like their strong construction which keeps the fertilizer mix exactly as it left the manufacturer. And the ease of handling lightweight units is welcome relief to a hard working man.

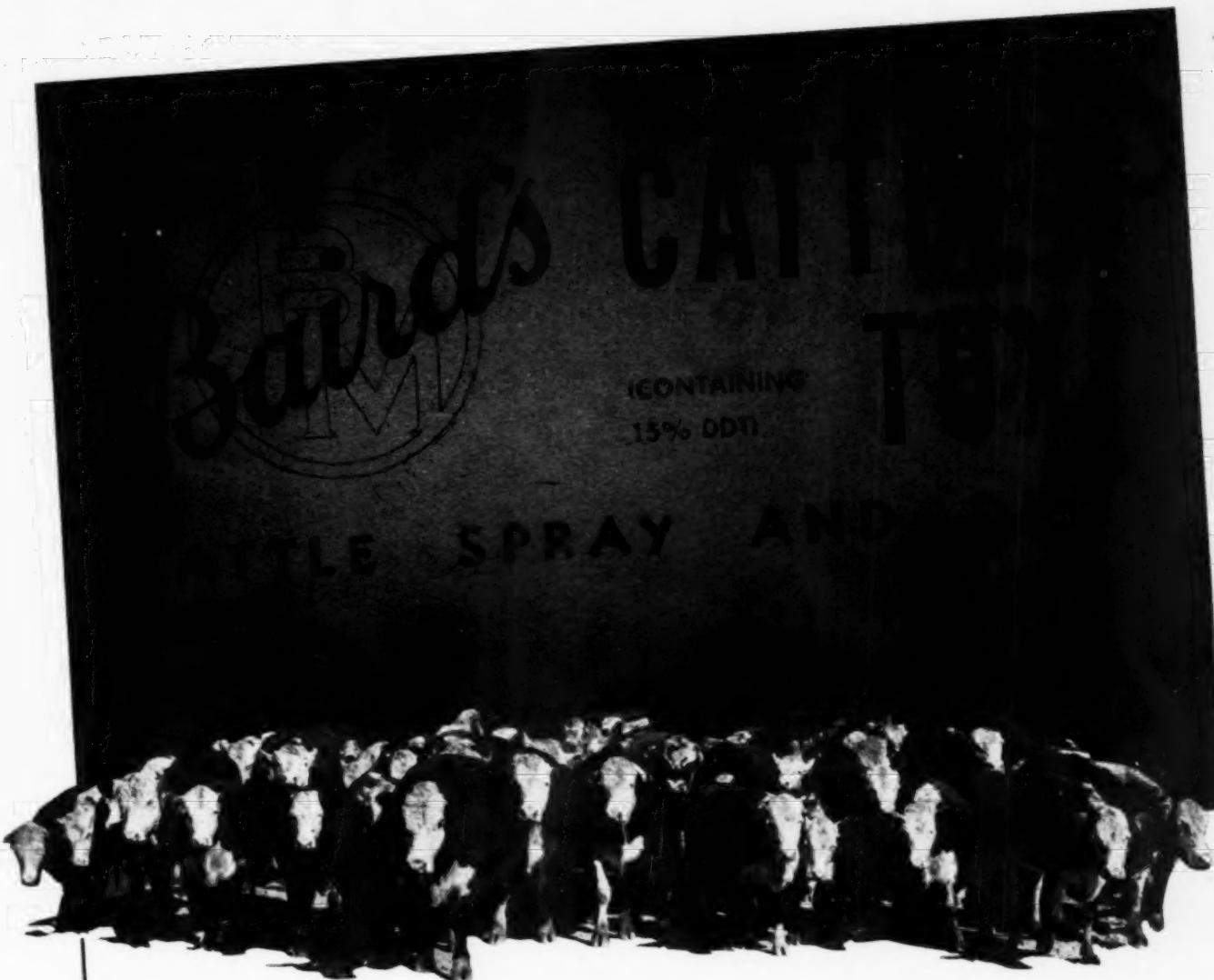
A St. Regis sales office near you will gladly give you facts and figures.

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BAIRD'S CATTLE-TOX is especially manufactured for
the effective control of flies, ants, mosquitoes, fleas, ticks.
Completely miscible with water, CATTLE-TOX
can be economically applied to farm building walls,
or used as a cattle spray or dip.

Write for complete information and samples.



Baird & McGuire, Inc. HOLBROOK, MASSACHUSETTS

NEARLY FORTY YEARS OF STEADY GROWTH AND GROWING SERVICE

At the present time Orbis Products Corp. is offering to manufacturers and dust mixers for immediate shipment limited quantities,

for experimental use, of this extremely powerful new organic insecticide in the form of a 25% Parathion Dust Concentrate.

Write, wire or phone for complete information and samples.
Let us solve your insecticide problems. No obligation.

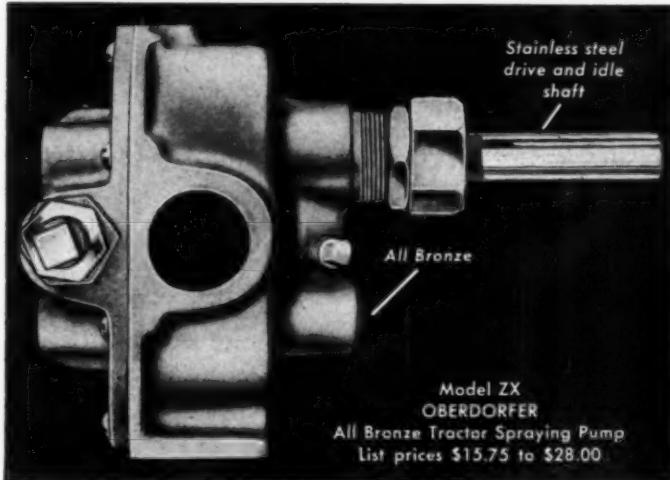
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AGRICULTURAL CHEMICALS

The LEADERS in weed spraying equipment use Oberdorfer Bronze Pumps



1. No corrosion with bronze and stainless steel.
2. Pressures up to 150 pounds per square inch.
3. Built-in adjustable pressure relief valve.
4. Lower cost than iron or similar design.
5. No priming to 15 feet below pump.
6. Four large Alemite lubricated bearings.
7. Easily installed by any mechanic.
8. $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ " and 1" standard pipe connections.
9. Backed by 50 years of bronze pump manufacturing.
10. All metal — no rubber.
11. From 2 gallons to 600 gallons per acre.

These companies who have for years made the most and the best high pressure spraying equipment have, almost without exception, standardized on Oberdorfer Bronze Spraying Pumps for their low-pressure weed-spraying rigs. Look at this list — internationally-known leaders in the field for so long:

John Bean Co. Lansing, Mich.
Buffalo Turbine Agricultural Co. Gowanda, N.Y.
A. B. Farquhar Co. York, Pennsylvania
Gustafson Mfg. Co. Corpus Christi, Texas
Hardie Mfg. Co. Hudson, Michigan
Niagara Sprayer (Chem. Div.) Middleport, N.Y.
Spramotor, Ltd. London, Ont., Canada
Speed Sprayer Co. Orlando, Florida

Every one of them — and dozens more of the finest spraying equipment makers on the continent — use Oberdorfer Pumps for their weed-spraying equipment. There can be no greater authority than these houses, whose life-long reputations depend on offering for sale nothing but the finest. It should be noted also that their acceptance of Oberdorfer Spraying Pumps has been confirmed by leading state universities and by field men — county agents and agricultural experts — everywhere.

The reason is obvious. Oberdorfer Pumps, with *bronze housing* and *bronze gears*, last longer with less attention in service with corrosive weed-spraying chemicals.

We have prepared a list of all the many manufacturers of weed-spraying equipment using Oberdorfer Bronze Spraying Pumps. To get your copy, simply mail the coupon below.

OBERDORFER BRONZE SPRAYING PUMPS

 Send coupon today for list
of manufacturers using Oberdorfer
Bronze Pumps on weed spraying
equipment.

Agricultural Pump Div.
Oberdorfer Foundries, Inc.
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Please send me without charge or obligation, a list of weed spraying equipment manufacturers using Oberdorfer Bronze Spraying Pumps.

Name.....

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Address.....



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The Modern Piper Brings a New Era in **INSECT CONTROL**

Of course, you remember what happened to the rats of ye old towne of Hamelin. They were lured into the river by the tuneful piper. And it's the same today when "VELSICOL 1068" Chlordane is used in, on or around the premises. So we just thought we'd show "Velsy" and have him symbolize how he lures all obnoxious household and institutional insects to destruction.

There's just something about "VELSICOL 1068" that bugs and insects can't resist. They eat it up! And then — pouff! — they are no more. But that isn't strange when you recall that "VELSICOL 1068" Chlordane is a non-repellent, strong stomach and contact insect toxicant. So take a tip. Just let "Velsy" pipe the tune of "VELSICOL 1068" — and then just watch the dance of destruction that follows!

For Further Information or Technical Data, Wire or Write

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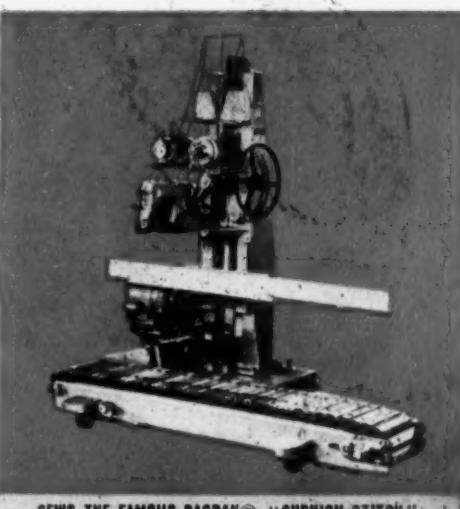
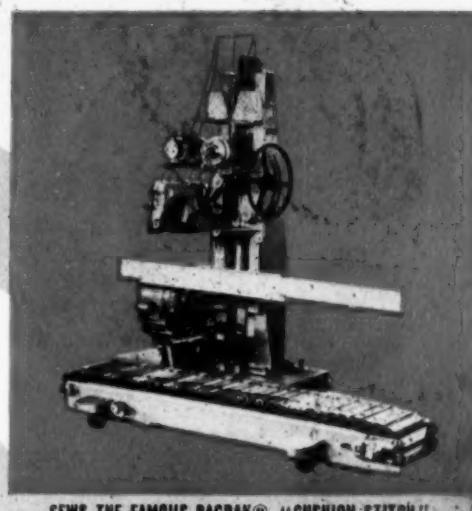
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Bagpakers!*

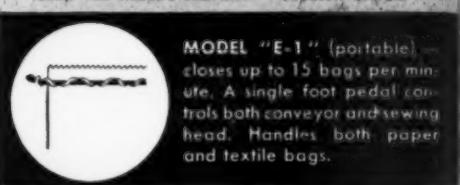
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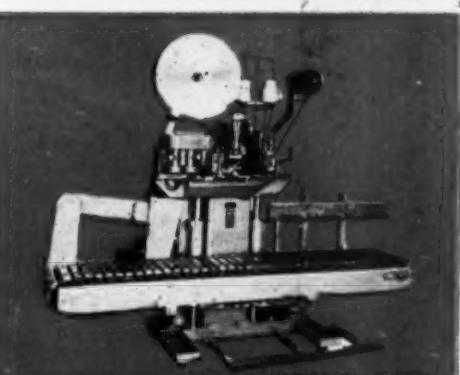
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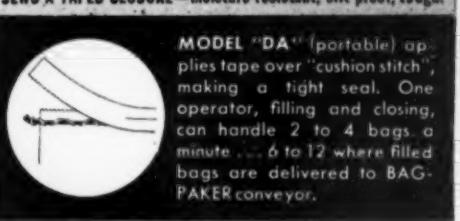
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MODEL "E-1" (portable) closes up to 15 bags per minute. A single foot pedal controls both conveyor and sewing head. Handles both paper and textile bags.



SEWS A TAPE CLOSURE—moisture-resistant, sift-proof, tough.



MODEL "DA" (portable) applies tape over "cushion stitch", making a tight seal. One operator, filling and closing, can handle 2 to 4 bags a minute... 6 to 12 where filled bags are delivered to BAG-PAKER conveyor.

WHY A PENCO* PROGRAM is a basic program

Here's a thorough-going insecticide program developed especially for fruit growers by Pennsalt—makers of Penco products. Pennsalt produces chemicals that go into Penco products right from the ground up—giving you high quality, superior results and low prices. Use this Penco program for effective control and bigger fruit profits.

For worm control: **PENCO WB-50*** with 50% DDT

This DDT spray contains superior spreaders and stickers for better coverage and reduced run-off. Micron-sized for better suspension.

KRYOCIDE* Natural Cryolite

This famous cryolite insecticide has been a leader for 16 years. It will not sterilize soil, upset natural insect balance, nor harm tender foliage or fruit. Not acutely toxic to man or animals, nor irritating to skin of sprayers and pickers. When in doubt, use *Kryocide*!

For aphid control: **PENCO* BHC** (Benzene Hexachloride)

W-12 Wettable Base has the very high Gamma Isomer content of 12%. Valuable new addition to spray programs, especially for apple aphids (green, rosy, woolly) up to fruit formation. Conforms to Pennsalt's rigid standards of quality and uniformity.

For spider mites: **PENPHOS** (Parathion)

Now in experimental stage is Pennsalt's newest organic phosphate insecticide—*Penphos* (containing Parathion). Tests at Pennsalt's Whitemarsh Research Laboratories show it holds great promise for control of various mites, spiders, aphids.

*REG. U. S. PAT. OFF.

For further details, write to





While push button farming may seem remote, you can be sure that the Powell company is doing all it can to make agriculture easier and more profitable.

To help **you** help the **farmer**, Powco Brand agricultural chemical research continues daily. These easy-to-use agricultural chemicals are pre-tested for **guaranteed** effectiveness. Check the list **now** to see which ones can be of service to you:

POWCO BRAND STIMTOX "A"—Low Cost "Fortified" agricultural Pyrethrum powder.

**PYRETHRUM POWDERS AND EXTRACTS
DDT PRODUCTS**

JP 25—A liquid, water-miscible DDT concentrate, 25% by weight technical DDT.

JP 50—Dust concentrate containing 50% by weight of technical grade DDT.

JP 50W—Wettable dust concentrate containing 50% by weight of technical grade DDT. Excellent suspensibility.

TECHNICAL DDT—Highest quality, powdered, and meeting government specifications.

2,4-D FORMULATIONS—Effective in the control of weeds in cereal crops, etc.

Sodium Salt of 2,4-D
Isopropanolamine Salt of 2,4-D
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BENZENE HEXACHLORIDE—A wide range of BHC products of varying gamma isomer content. Sold as dry dusts and wettable powders, oil soluble and water emulsion concentrates.

ANTU—Alpha Naphthyl Thiourea, highly toxic, economical rodenticide. Kills rats in 12 to 48 hours. Non-irritating to the skin. Sold in pure form or as 20% dust.

Our laboratories and our technical knowledge of agricultural chemical problems are at your service. Let us know how we can help you.



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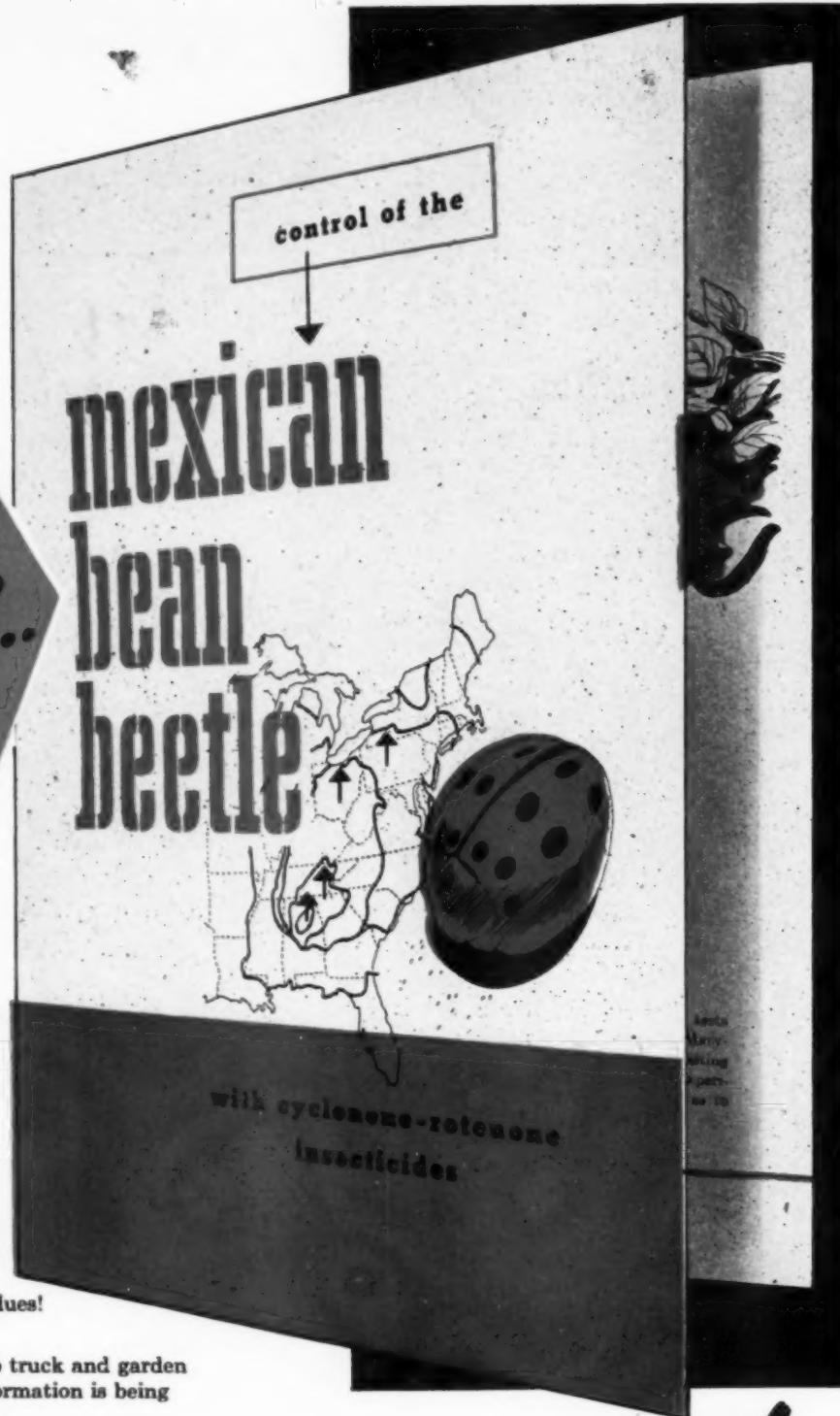
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Now ready...

**and that's
only part
of the story**

Here's the rest—

- Concern over hazards arising from toxic insecticide residues remaining on edible truck and garden crops at time of harvest is paramount with growers and canners.
- Cyclonene Insecticides leave no toxic residues! *They Are Amazingly Effective!*
- Control of nearly all insects destructive to truck and garden crops is now definitely established. Full information is being distributed as rapidly as conditions permit.
- For safety . . . for insect control with economy—look to Cyclonene-Rotenone, Cyclonene-Pyrethrins, and Cyclonene-Rotenone-Pyrethrins insecticides.



Write us today for your copy of U.S.I.'s new
booklet on the Control of the Mexican Bean
Beetle with Cyclonene-Rotenone Insecticides.



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*Millions
in Europe
go hungry -
WHILE
HE EATS!*

FARMERS AND GOVERNMENT LAUNCH
NATION-WIDE RAT CLEAN-UP CAMPAIGN

Baker's ANTU *ready for immediate shipment!*

Rats eat or destroy 200,000,000 bushels of grain in this country yearly—estimated by a Government Service. This is enough to feed millions of Europe's hungry people.

The Government is spearheading a coast-to-coast campaign against our estimated 137,000,000 rats—the U.S.D.A. and U.S. Fish and Wildlife Service cooperating. County agents are organizing community campaigns.

A chief weapon to be used in this rat-battle will be ANTU. It is one of the most effective poisons known for the brown (Norway) rat—the most common species on farms and in towns of U. S.

In concentrations of 2 to 3%, ANTU is more readily accepted by rats than red squill. ANTU mixes evenly with baits of usual type—sticks to the feet and hair of rats when dusted in runways. It is somewhat toxic to dogs and pigs, but relatively non-toxic to most other domestic animals such as chickens, cats, etc.

ANTU is a finely granulated gray powder—insoluble in water but slightly soluble in some organic solvents including ethyl alcohol, acetic acid, dioxane.

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THE EDITOR COMMENTS

INdications of a veritable war against the use of 2,4-D are being noted in various parts of the country. The State of Arkansas, for instance, last month seized all weed killer materials in certain areas, removing from dealers' stocks considerable quantities of 2,4-D in both spray and dust form. About the same time the Civil Aeronautics Authority was forbidding the use of aircraft for applying 2,4-D, following increasing complaints on the part of cotton growers that drifting dust particles were damaging their crops. These particles were said to have journeyed up to 10 miles from rice fields which were being dusted.

Even more serious legislation was made effective in the State of Louisiana on July 1. This new Act prohibits "the importation, storage, sale and use of 2,4-D or any of its derivatives in dust form," and also of 2,4-D esters. It forbids use of air jet, air blast or turbine blower spray equipment for applying 2,4-D. Handlers, retailers and jobbers of 2,4-D must file with the state monthly reports of who buys the material, along with other information. In other words, use of 2,4-D is completely hamstrung in Louisiana.

There is no question about the potential dangers of using this new agricultural weapon, particularly when it is permitted to get into the hands of persons who have little knowledge about its action and the proper time and place to use it. We hope that these actions will be of temporary duration, until a way is found to allow responsible people to use the material in a safe and proper manner.

In the meantime, the U. S. Department of Agriculture is studying the situation, with some of its weed experts making test flights to determine the drift of 2,4-D dusts and sprays from different altitudes and under varying wind conditions. Their findings are expected to form a basis for further action in the safeguarding of crops.

Taking the long view, solution of the 2,4-D

problem seems to lie not so much in regulation as in education on the part of those who use the material. This may mean labels with even more information, but that is a study in itself. From the ones we have seen, it would be difficult to think of many more warnings or instructions to add. And it would also be a problem to find space for more words. In the meantime, we hope, no more hysterical action will be taken with 2,4-D.

AN attempt to re-examine the new organic insecticides and establish both their values and limitations on the basis of reliable scientific investigation, is getting under way with the Agricultural Insecticide and Fungicide Association spearheading the move. That such action is greatly needed is seen by abundant evidence on all sides. Any success in cutting through the maze of conflicting reports on toxicity, on effectiveness, on danger to man and warm-blooded animals should be welcomed not only by agriculture but by the industry itself.

An over-all committee has been formed to coordinate all available scientific data on the organics. This group will make a study of the problems which have been created by the introduction of the new organic pesticides, and will attempt to solve such problems. The AIF Association has extended invitations to all 48 state experiment stations and departments of agriculture to send copies of their reports and research on organics. Although this information is necessarily incomplete because of the rapid and continual introduction of new pesticides and herbicides, such a collection will represent probably the largest mass of information yet to come before a reviewing committee.

The centralization of information regarding the new organics will be of great help in untangling the conflicting data. It may be found that there is not as much actual conflict as many think, but rather misunderstanding of termino-

logy in various parts of the country. At any rate, actions of some of the country's foremost authorities in getting together on the subject for the purpose of reaching definite conclusions, eventually is bound to bring some sort of order out of the present situation.

PROSPECTS for a continued rise in fertilizer production and in the demand for plant food products were described as good at the recent meetings of the two national associations last month. Maurice H. Lockwood told the National Fertilizer Association that the industry may expect another eight percent increase in volume for the coming year, barring strikes or other handicaps; and Senator Scott W. Lucas, speaking before the American Plant Food Council, assured the industry that "Plant food materials . . . are going to have to be used more than ever to develop safer and more profitable systems of farming." Added up, the two statements make sense, for the conservation of soils and the rehabilitation of large areas of land will require great quantities of fertilizer materials not only for the present, but on a continuing basis. Therefore, the conclusion appears inevitable that the industry must increase production to keep up with universal needs.

Numerous factors enter into the current expansion of the fertilizer industry, but underlying it all is the worldwide need for food for a steadily increasing population. The industry has reason to regard the picture with optimism. The U. S., a nation with no more virgin land to exploit and with much of its farm land wearing out, is faced with the necessity of making each workable acre produce more than ever before. The farmer therefore has no alternative but to use more fertilizer materials not only on old acreages, but also on areas which up to the present time had apparently needed little if any chemical plant food.

There was every indication at both recent conventions that the fertilizer industry realizes fully its sobering responsibilities, and that it can and intends to meet them alone and unaided by government assistance. Heavy attendance and discussion at the convention business sessions

was eloquent of this. Total attendance at the two meetings, incidentally, was over 900 persons . . . over twice the number who represented the industry just a few years ago.

One of the foremost examples of what private initiative can do toward meeting a pressing need, is the record made by the fertilizer industry during the past years. As long ago as 1946, the industry doubled its 1935-39 prewar average, and increased that figure even more in 1947. Barring handicaps beyond the control of industry, such as labor difficulties and transportation bottlenecks during the period, the record would have been even more impressive.

Only the future can tell, of course, where the continuing demand for fertilizer will taper off, but it is evident that whenever the time comes, the drop is not likely to be great. The cash value of commercial fertilizer in growing better and more profitable crops has been too well demonstrated to most American farmers.



FTER checking the market prices for certain insecticide materials, we begin to wonder if normal profit incentive has fled from the insecticide business. Demand for some products has not been as active as it might have been, but this alone does not seem to be sufficient reason for what appears to be unreasonably low prices in some instances, —prices which tend to unsettle and unbalance the entire market.

For prices which are unnecessarily high, we hold no brief. But, neither do we believe that too low prices in the case of commodities such as insecticides are of any real eventual benefit to the ultimate user. The chain of economic events which follows under these conditions needs no detailed explanation. Some suppliers are priced out of the picture and in the long run the consumer, the farmer in this case, gets it right in the neck. Far better it would be to our way of thinking if the farmer today, when he can afford it if he ever could, paid a few cents more per pound as insurance for his own future. And we feel that sound agricultural economics supports this view. Cut-throat markets invariably bring cut-throat quality deterioration.



Dr. S. E. A. McCallan

Boyce Thompson Institute of Plant Research
Yonkers, New York

FUNGICIDES and insecticides are so commonly grouped together, not only in discussions but also in general handling and sales, that it is not surprising the difference between them is sometimes kept none too clearly in mind. Insecticides of course are chemical preparations to control insect pests, and fungicides similarly, are to control fungus diseases. However, fungi are not insects, and insecticides will not control plant diseases caused by fungi even though unfortunately, they are sometimes used for this purpose.

Cause of Disease

IN order to understand more fully how we set about controlling plant disease by the application of fungicides, it is well to consider what causes the diseases in the first place. Diseases in plants are caused by three main agencies, fungi, bacteria, and viruses. The fungi are themselves plants, but because they lack the chlorophyll or green coloring matter of the so-called higher plants, they must live as parasites on other living plants or else on dead plant and animal remains. When they attack the living plants they cause diseases

of more or less serious consequences. Common fungi such as the mushrooms, mildews, and molds are very familiar. The main body of the fungus, corresponding to the stem, roots and leaves of higher plants is the thread-like mycelium. In time the mycelium produces its seeds, or as they are called spores. These are microscopic in size, produced in immense quantities and are blown around in the wind and splashed by rain. If they alight on a plant which is susceptible to their attacks, they will germinate and penetrate the plant, causing a diseased condition. The diseases vary greatly—some may be merely local, others may involve and kill the whole plant. However, in general, once a fungus is inside the plant little can be done to control it. The only way to destroy it, is to destroy all the infected part of the plant. Thus the main principle of controlling plant diseases by fungicides is to protect the healthy plant by applying a protective coating of chemical spray or dust over the surface. Thus when a fungus attacks, it will be killed or prevented from germinating and infecting the plant. Timeliness in spraying and dusting is

most important, for the fungicides must be applied before the fungus invasion. In the case of fruit trees, the spray schedules as worked out by the various state experiment stations emphasize this timeliness and show not only what to spray but especially *when* to spray. With important vegetable crops such as potatoes it is usually necessary to spray or dust every week or ten days to keep the foliage covered with a protective fungicide.

The fungi are not limited in their attacks to foliage but all parts are susceptible. Seeds frequently carry spores which will infect the sprouting seeds. In many cases seed decay may be prevented and a high emergence of seedlings obtained by treating the seeds with appropriate chemical dust. If the seed is actually infected, however, seed protectant chemicals or disinfectants will usually not be effective. Instead, in a few cases special hot water immersion treatments are given, but generally such seed had better be destroyed. Many fungi live most of their lives in the soil but can attack the root systems of plants and cause wilts of varying kinds. Such diseases cannot be controlled by spraying or dusting

the foliage. In a few instances they may be eradicated from the soil by the use of suitable soil fumigants, but often this is not practical for large areas. Some fungi are very limited in their attacks and will infect only certain varieties of a given plant, others will infect all plants of a given family such as cabbage, cauliflower, broccoli, Brussels sprouts, kale, turnip, radish, etc. Others, especially the soil fungi, can attack many different kinds of plants, which is an unfortunate situation.

The bacteria, while of prime importance in causing human disease, are secondary to the fungi so far as plant diseases are concerned. The bacteria, somewhat similar to the fungi, are usually single cell organisms which multiply very rapidly by the simple process of dividing in two. They also can attack all parts of the plant. At present few plant diseases caused by bacteria are amenable to control by chemical sprays or dusts, i.e. bactericides, though it is to be expected that in time research will discover effective bactericidal compounds for application on plants.

The viruses are now considered to belong to that border land between the animate and inanimate world. They are too small to be seen under any ordinary microscope, and have been identified as highly complex proteins in nature. Plants infected with virus diseases are typically mottled or yellowed. They are spread commonly by the feeding of insects and since there are as yet no effective chemicals for their direct control, the application of chemicals here is limited to the use of insecticides in an attempt to control the virus-carrying insects.

Until relatively few years ago the field of fungicides was limited and fairly simple, but with the advent of the fixed coppers and wettable sulfurs, and especially the organic fungicides there are now many more to keep in mind. The introduction of new ones at a fairly rapid pace complicates matters further. From a chemical point of view there are four main groups of fungicides, those containing as the chief active ingredient either sulfur, copper, or mercury, and

lastly, the large and very broad group called the "organics." Strictly speaking one should set up a class of metallo organics, which are "hybrids," but for the sake of convenience such shall be considered under the organics excepting the organic mercuries. There are also a few metallic compounds such as zinc, chromium, and cadmium, which are just beginning to enter the agricultural fungicide field and which may become of increasing importance. In the discussion of fungicides, there will be frequent occasion to mention as examples various trademarked products. It should not be inferred that these are the only materials available nor necessarily the most effective.

Sulfur Fungicides

SULFUR is the original fungicide, its first use probably antedating written history. At present some 150,000,000 pounds are consumed annually for this purpose in the United States. Sulfur is also an insecticide and for both fungicidal and insecticidal purposes it is available in three main forms: sulfur dust, modified sulfurs of various kinds, and lime sulfur. In modern processes the sulfur dust is ground to produce a very firmly divided powder that will pass through a 325-mesh screen, since it has been found that the finer sulfur particles are more effective. This type of sulfur of course is applied as a dust.

The modified sulfurs constitute a large group of wettable or paste sulfurs prepared by different methods but with the common objective that they may be readily wetted and dispersed for use as a spray. The particle size varies in general according to the method of manufacture. Flotation sulfurs are obtained from coal gas purification and possess one of the finest of particle sizes. Most flotation sulfurs are in paste form. Sulfurs produced by the emulsification and atomization of molten sulfur also have particles of the finest size and are said to be very uniform. Examples of these are "Mike" and "Magnetic 70." Micronized sulfurs, such as "Micro Spray," "Micronized" and "Mulsoid" are prepared in special

impact and air separator mills. Sulfur dusts prepared in the conventional grinding mills have somewhat coarser particles and include the largest number of wettable sulfurs. An unusual type of modified sulfur, i.e. "Kolofog" is made from the fused product of sulfur and colloidal bentonite (a clay.)

Lime sulfur is prepared by boiling together sulfur and milk of lime. The active ingredients are generally considered to be the polysulfides. However, the measure of quality is usually specified by the specific gravity, 32° Baume being standard. This is diluted considerably before use. Industrially-made lime sulfur is definitely superior to the home-made product. Lime sulfur that has dried and decomposed on the sprayed plant is said to have the finest of all sulfur particles and is the most toxic. It must be used with the greatest caution since it is more likely to burn plants, presumably due to its polysulfide content.

Sulfur fungicides are used most extensively on the fruit crops such as, apple, pear, peach, cherry, and plum. They are also widely used on certain ornamentals such as roses and in general to control the powdery mildew type of fungus disease on all kinds of plants. Sulfur ordinarily is not used on vegetable crops nor as a seed treatment. Sulfur in dust or wettable form is compatible with most common insecticides and fungicides except the oil sprays. Lime sulfur, however, is incompatible with many other sprays and must be used with much caution.

Copper Fungicides

WITH the accidental and classical discovery of Bordeaux mixture in France 66 years ago, the important copper fungicides were introduced. Despite a very large amount of research, Bordeaux mixture still remains the outstanding copper fungicide. Some 100,000,000 pounds of copper sulfate are used annually in the United States in the preparation of copper fungicides.

Bordeaux mixture is prepared by mixing together a copper sulfate solution and suspension of hydrated lime, one or both being in dilute form.

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The formula is expressed thus: 8-8-100, meaning 8 lbs. copper sulfate pentahydrate, 8 lbs. lime and water to make 100 gals. spray. There are many modifications of this formula usually to give less copper sulfate and also sometimes less lime. The more finely divided forms of copper sulfate such as "snow" are preferred since the crystals go more rapidly into solution. Stock concentrations of copper sulfate and hydrated lime may be prepared in advance, but the final mixing is not done until just before use as the Bordeaux mixture is not stable. There are various preparations of dried or paste Bordeaux on the market, but unlike lime sulfur these industrially prepared mixtures generally are not considered as effective as the well prepared home-made mixtures, although more convenient to handle. Probably one of the greatest virtues of Bordeaux mixture is its almost perfect physical condition and ability to stick to sprayed foliage through excessive weathering.

Because Bordeaux is a very strong fungicide and likely to injure plants, not only from the copper but also from the lime, and also because it is messy to prepare, many attempts have been made to develop substitutes, and the so-called "insoluble" or "fixed copper" fungicides have come into being. These fixed coppers may be classified into four general types: (a) basic sulfates, including such preparations as the tribasic copper sulfates, e.g. the "Tennessee Tribasic" series, while other basic sulfates are "Bascop" and "Bordow," (b) the basic chlorides such as copper oxychloride, e.g. "Compound A," "Cupro K," and "C.O.C.S.," (c) oxides, as the red and yellow cuprous oxides, e.g. "Cuprocide," and (d) a miscellaneous group of copper silicates, phosphates, zeolites, etc. such as "Copsoil" and "Copper Hydro 40." The copper oxychlorides are considered to be the most effective in disease control but likewise also somewhat more toxic to foliage. The sulfates and chlorides are the most widely used. The fixed copper fungicides are available both as sprays and as dusts and in general they are less injurious than Bordeaux mixture, more convenient to handle,

and for many uses give good disease control. They are frequently combined with insecticides, with which they have a wider compatibility than Bordeaux.

The copper sprays and dusts have been used especially on potatoes, other vegetables, grapes, on tree fruits to a limited extent (injury here is a possible factor), and on ornamentals. Only two copper fungicides are commonly used as seed treatments. Cuprous oxide is especially effective on vegetable and ornamental seed except on members of the cabbage family where it is injurious and should not be applied. Copper carbonate dust has been used extensively as a seed grain treatment particularly to control bunt of wheat; however, it has been largely replaced by the organic mercury treatments.

Mercury Fungicides

MERCURY is one of the most toxic of all elements to the fungi. Mercuric chloride, mercuric oxide and mercurous chloride have had limited use as dips for tubers, seeds, and other plant parts. However, the outstanding use of mercury began with the discovery in Germany, at the beginning of World War I, of the effectiveness of certain organic mercury compounds. These were subsequently introduced into the United States. They have been developed under the trade names of "Semesan" or "Ceresan" or modifications of these. The active ingredient is ethyl mercury chloride or phosphate, or hydroxymercuricchlorophenol, or nitrophenol. These compounds are being used extensively as seed, tuber, bulb, etc. treatments, and the different preparations have been found most advantageous for certain specific applications. Another organic mercury preparation, phenyl mercuric cyanamide, sold as "Barbak C," is used particularly as a seed corn treatment. The organic mercury compounds in certain cases because of their volatile nature are able to penetrate beneath the seed coat and destroy the fungi in infected grain. Because of the high toxicity of mercury to humans and animals these chemicals must be handled with care, and of course

treated tubers or seed cannot be used for feed.

Very recently organic mercury compounds have been introduced experimentally as sprays for fruit trees and plants in foliage under the general name of "Puratized." The active ingredient of the most prominent is phenyl mercury triethanol ammonium lactate. The amount of mercury actually applied is very small. Promising results have been obtained on apples and ornamentals. The toxicity hazard to humans when used on food crops needs further clarification.

Miscellaneous Inorganics

VARIOUS heavy metals are known to possess high fungicidal value such as silver, cadmium, chromium, lead, and arsenic, but as yet few have found practical applications. Zinc oxide has limited use as a seed treatment but is generally inferior to other standard treatments. Preliminary results with a new series of chromate complexes containing other heavy metals indicate that they may have promising uses in a variety of agricultural fungicide applications.

Organic Fungicides

A FEW years ago the only organic compound with any substantial application as an agricultural fungicide was formaldehyde which was used for seed and soil treatments. Now, however, as the result of extensive research by the chemical industry and experiment stations, many new organics show promise. A number of different types of organic compounds have been found to possess marked fungicidal properties. Many of these of course are still in the experimental stage, but some have established a place for themselves. It is to be expected that new ones will continue to appear to replace in part at least the older sulfur and copper fungicides. A disadvantage and handicap of most organic fungicides is their higher cost per pound in comparison with sulfur or even copper. However some are showing superior performance or are suffi-

(Turn to Page 77)

f Continuing perity

Third Annual Meeting

DISCUSSIONS covering soil conservation, radioactive materials as tools in agricultural research, an agricultural editors' forum, and talks by a U.S. Senator and Congressman formed the highlights of the third annual convention of the American Plant Food Council held at The Greenbrier, White Sulphur Springs, W. Va. The meeting was a four-day affair, beginning June 13. The Council's annual banquet was held Tuesday evening, and on the previous evening the sound movie, "First in the Hearts of Farmers," was shown.

Clifton A. Woodrum, president of the A.P.F.C. presented the opening address Monday morning, pointing out the basic importance of agriculture in general, and stating that it is actually "big business," a 100 billion dollar industry. He said that the time has come for the fertilizer industry to "drop its timidity," and to make its voice heard. He urged business men in general and the fertilizer industry in particular to support sound government and to take an increased interest in its function.

Perhaps the keynote of the entire meeting was sounded at the agricultural editors' forum held at breakfast time Tuesday morning. Taking part in the discussion were four nationally-known magazine editors: Paul C. Johnson, Chicago, *Prairie Farmer*; Carroll P. Streeter, Philadelphia, *Farm Journal*; Dr. L.

R. Neel, Nashville, Tenn., *Southern Agriculturist*; and Dr. Paul D. Sanders, Richmond, Va., *Southern Planter*. Dr. Sanders, president of the American Agricultural Editors' Association, acted as moderator. Louis H. Wilson, A.P.F.C. director of information, and editor of the *Plant Food Journal*, presided at the session, introducing other editors and

radio reporters who were present in the audience.

The role of farmers in private enterprise was the general theme pursued by the editors. Dr. Sanders termed the American farmer as "the very essence of the free enterprise system." He said that they are men who "feel the pride of ownership and responsibility of service," but regretted that in many cases they have been denied the better things of life in the way of physical conveniences, and have not received many of the honors due their group for the contribution they have made.

"A strong agriculture and a better understanding between the farmer and the businessman are major factors in preserving the competitive free enterprise system as we know it in America . . . the interest of industry and the interest of the farmer are identical . . . inseparable," he said.

Mr. Johnson warned that "the time may not be far distant when the farmer, whose business and outlook are the essence of private enterprise, may find socialistic forces moving in on him at an alarming rate." He observed further, that when such forces do come, they "will be flying the flag of soil conservation." The delicate task of achieving an effective soil conservation program without granting government sweeping powers to do a quick job, was weighed by Mr. Johnson. He stated that many business leaders have al-

New Members of A.P.F.C. Board of Directors

(Terms Expiring June 30, 1951)

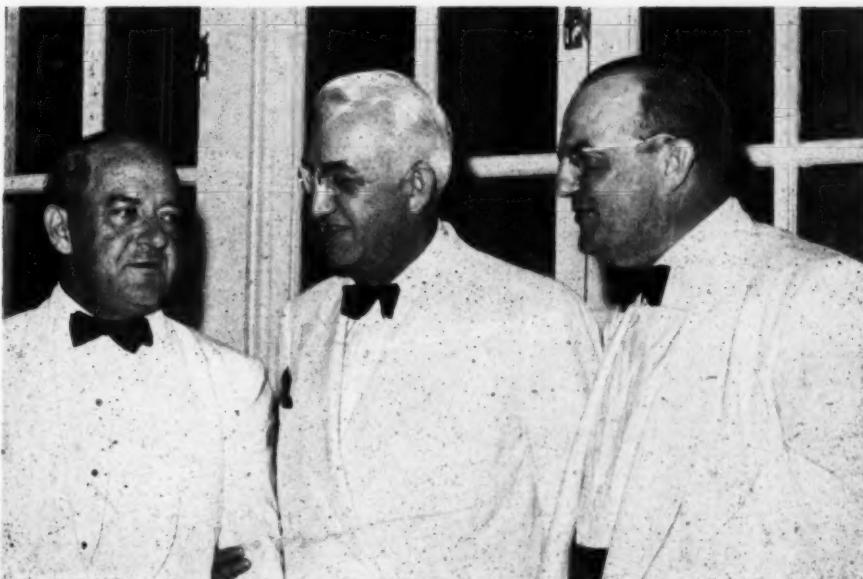
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(Lion Oil Company)
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(Naco Fertilizer Company)

Clifton A. Woodrum, center, president of the A.P.F.C., introduces J. A. Howell, executive vice-president of Virginia - Carolina Chemical Corp., Richmond, Va., (right) to Dr. Francis P. Gaines, president of Washington and Lee University, Lexington, Va. Dr. Gaines was the principal speaker at the A.P.F.C. annual banquet held on June 15. (APFC Photo)



loured their zeal for conservation to overbalance their belief in private enterprise to the extent that they advocate coercive measures that would soon remove agriculture from the field of private enterprise. Yet, these same leaders wage a never-ending fight against the government's encroaching on their own right to do business, he said. The same attitude is sometimes seen in farmers, too, even though they are themselves excellent custodians of the land and have grown prosperous under the present system. Even so, they will blithely advocate controls which would eventually rob them of all rights of independent decision. Mr. Johnson expressed hope that the farmer will choose the more difficult, but democratic way, to achieve higher production and assure America of better soil 100 years hence. He emphasized that the farmer must bear the responsibility, but to do this with intelligence, a selling job must be done so that he may see the value of such independent effort. He outlined for industry a "great deal of work," much of which must be done jointly, before "government bureaucrats" take over the task.

Mr. Streeter stated in his talk that farmers at the present time are tired of "big government." They are the number one capitalists, wholly favoring private enterprise. However, there is no assurance that they will always be that way, he warned. "I am not saying that farmers . . . are

about to switch over suddenly from their traditional stand for individual freedom to clamor for big government and statism," Mr. Streeter added. "They will never do it so long as they can get a decent break from the private enterprise system," he said.

If industry's leaders are to keep farmers allied with them in defense of the private enterprise system, the "first tactic is to help keep agriculture prosperous" and secondly, "make that system work before the farmers' eyes." He emphasized that right now is the time for industry to make friends with farmers. "Right now is the time when action will pay off." Farmers are pretty well convinced by now that 135,000,000 people, free to make their own decisions will make fewer mistakes than 135 bureaucrats, he concluded.

Dr. Neel, in continuing the discussion in a similar vein, reminded that the farmer is interested in free enterprise not only in his profession, but equally so in the same system for industry and commerce. "The world is reverting to socialism and the infection has reached our shores," he added. "As a nation, we must make a determined fight to retain our freedom just as our forefathers fought to establish it here in the wilderness.

"It is the interest of all that the line be held for private enterprise where it is now. The making of further inroads into the field by Government should be done with greatest

deliberation and only when every possible effort is made to avoid such a step." He praised the fertilizer industry as having done "a great job," adding that "as in other United States industries, they have led the way for the rest of the world."

Fight Against Hunger

SENATOR Scott W. Lucas, (D-Ill.) in his prepared address stated that manufacturers and distributors of plant foods are going to have to work hard in the fight against world hunger. "Plant food materials for conservation and improvement of the soil are going to have to be used more than ever to develop safer and more profitable systems of farming . . . we need a national fertilizer policy than fits the long term objectives of agriculture. Such a policy should be directed toward the adoption of a better system and the development by private industry of production facilities to supply farmers with the materials they need," the Senator said.

He stated further that although much has been done in helping the farmer produce more, we have lagged behind in improving the mechanics of distributing farm produce. Progress is being made along this line, however, under the research and marketing act. "We must now find new and extended uses for agricultural products," he continued.

"Research on the development of new methods for the industrial



—Photos courtesy American Plant Food Council

use of edible crops for non-food uses or for new food and feed uses has an important place in any agricultural program," he said in emphasizing that "agriculture needs a permanent long-range program."

Work for Everyone

DR. R. E. Yoder, field research supervisor of the Ohio Agricultural Experiment Station, Wooster, told the convention that "The problems of soil productivity maintenance or soil conservation are of vital sig-

nificance to all areas of our society since it is from the land resources that the nation primarily derives the three basic necessities of life—food, clothing and shelter."

A sound conservation program must not only touch the one family that makes its living on the land, but also must drive home the significance of conservation of soil and water resources to the five urban families that depend on the land for food and fibre," he emphasized.

Dr. Yoder declared that "the door is open for selling not only fertilizer but also a continuous, sound program of conservation education in which fertilizer usage is present as a 'key' to the basic problems of filling fully the food and fibre needs of the nation while moving forward toward true conservation of land resources."

In discussing the heavy production of Ohio agriculture during the war years, Dr. Yoder attributed from 20 to 30 percent of this yield to the "contribution of commercial fertilizers."

Representative August H. Andresen, Minnesota, told the A.P.F.C. group Tuesday morning that the Federal Government should initiate policies to encourage abundant production in every field of endeavor under our traditional American system. He predicted that the 80th Congress which was nearing the end of its session at that time, will go down in history as a Congress of achievement. "From its inception in January, 1947, the majority has progressively removed the shackles of government controls and regimentation of business and the people." He pointed out some of the difficulties in the agricultural field resulting from shortages of labor, implements and fertilizer materials, and discussed at length the European Recovery Program which he charged does not always feed the hungry people for whom the relief materials are intended, since these peoples usually lack the funds to purchase the American supplied goods in many of the countries included in ERP.

He called upon the U.S. Government not to limit its fight to destroy communism in other parts of

the world at the expense of overlooking communist infiltration at home. "We must continue our efforts to remove from public service all persons who seek to destroy our freedom and form of government . . . Communists everywhere should be exposed to the light of day." He declared that we must get our house in order, for the eventual "day of reckoning," by instituting sound policies today.

Radioactivity as Tool

THAT developments in the field of radioactive materials are lending themselves as powerful research tools in agriculture, and that such findings "will be used extensively and have considerable effect on fertilizer practices" was asserted by Dr. Frank W. Parker, assistant chief of the U.S.D.A. Bureau of Plant Industry, Soils and Agricultural Engineering, Beltsville, Md. Explaining soil-fertilizer research with radioactive materials, made possible with the development of the atomic bomb, Dr. Parker said that it has become clear that the public interest would be served if a thorough study were made of the influence of these materials on plants when applied to the soil, and that accordingly a grant from the Atomic Energy Commission has been made to support such a project. He explained the two fields into which use of radioactive materials has been divided. The first deals with the possible use of these materials in fertilizers to influence plant growth; and the other lies in research where the effects of plant nutrient elements may be traced accurately. Dr. Parker predicted not only that radioactive materials will be used more extensively, but that they will bring about changes in fertilizer production and use.

The manner in which the radio-elements are detected and traced in the soil, through the plant, and in the animal was explained by Dr. Parker. These materials, he said differ from ordinary elements only in that the former give off a radiation as they disintegrate. "Thus we could fertilize a soil with radio-superphosphate, grow clover, feed the clover to

(Turn to Page 75)

With the camera at A.P.F.C. meeting: top row, left to right: Harry B. Caldwell, Master N. C. State Grange; Judge Woodrum, J. C. Crissey, president, Coop. GLF Soil Building Service, Inc., Ithaca, N.Y.; and C. B. Robertson, president, Robertson Chemical Corp., Norfolk, Va.

Second photo: A. P. Sale, Jr., Cooperative Fertilizer Service, Inc., Richmond, Va.; Walter S. Hupp, vice president, Baugh & Sons Co., Baltimore, Md.; and W. T. Steele, Jr., Southern States Cooperative, Richmond, Va.

Second row: Dr. John R. Taylor, Jr., agronomist, American Plant Food Council, Washington, D.C.; W. T. Hart, chief, Fertilizer Section, Office of Materials Distribution, Dept. of Commerce, Washington, D.C.; and Dr. Robert E. Yoder, Ohio Agricultural Experiment Station, Wooster, Ohio. Second photo: Al Woods, Jr., Potash Company of America; Jeff D. Stewart, Federal Chemical Co., Louisville, Ky.; and P. C. Ausley, Potash Company of America, New York.

Third row: Dr. L. R. Neel, editor, "Southern Agriculturist," Nashville, Tenn.; Paul C. Johnson, editor, "Prairie Farmer," Chicago; and Leroy Donald, Lion Oil Co., El Dorado, Ark. Second photo: Malcolm E. Hunter, general sales manager, Virginia-Carolina Chemical Corp., Richmond, Va.; G. T. Cunningham, Armour Fertilizer Works, Atlanta, Ga., and John V. Collis, president, Federal Chemical Co., Louisville, Ky.

Fourth row: W. T. Wright, vice-president of F. S. Royster Guano Co., Norfolk, Va.; and Fred J. Woods, vice president of Gulf Fertilizer Co., Tampa, Fla. Second photo: Carroll P. Streeter, managing editor, "The Farm Journal," Philadelphia; Paul C. Johnson; Donald G. Lerch, director of agricultural ("Country Journal") Columbia Broadcasting System, Washington, D.C.; and Dr. Paul D. Sanders, president of the American Agriculture Editors' Association and editor of "The Southern Planter."

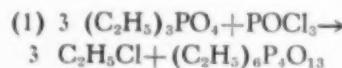
Bottom row: Al Baker, Jr., Bradley & Baker, New York, chairman of the A.P.F.C. Golf tournament; and Mrs. Fred J. Woods display two of the numerous prizes awarded winners. Second photo: Dr. Frank W. Parker, assistant chief of the Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. D. A., Beltsville, Md., making his address at the meeting; Third photo: father and daughter: Mrs. Jean Bumstead, Roanoke, Va. with her father, George E. Petitt, vice president of Potash Company of America, New York.

Chemical Assay of

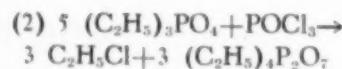
TETRAETHYL PYROPHOSPHATE

TETRAETHYL pyrophosphate is the principal active ingredient of the mixture (1) which has been called hexaethyl tetraphosphate. Other ingredients which are relatively inactive are ethyl metaphosphate and triethyl orthophosphate. There is some evidence that pentaethyl triphosphate is present in the mixture as another active constituent. The principal insecticidal activity, however, is due to the tetraethyl pyrophosphate.

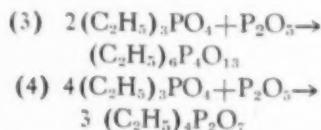
As originally manufactured by the Schrader process (2) the so-called hexaethyl tetraphosphate may be represented by this equation:



The original procedure as given above was modified (1) by increasing the proportion of triethyl orthophosphate to give a reaction product of higher tetraethyl pyrophosphate content and consequently of higher biological activity:



Insecticidal end-products containing tetraethyl pyrophosphates similar to those obtained by equations 1 and 2 have been made by a process patented by Woodstock (3). This process utilizes phosphoric anhydride in place of the phosphorous oxychloride to react with triethyl orthophosphate as follows:



In all cases the reaction products given by the above equations are mixtures which, upon elementary analysis, approximate the empirical formulas indicated. The products of the above reactions contain in different proportions triethyl orthophosphate, ethyl metaphosphate and tetraethyl pyrophosphate, the latter compound when applied in aqueous medium accounting for substantially all of the biological activity. The method which has been described (1) for the isolation of tetraethyl pyrophosphate from these reaction mixtures was based upon the differential hydrolysis of a given mixture followed by solvent extraction of the largely unhydrolyzed tetraethyl pyrophosphate and triethyl orthophosphate. The proportion of tetraethyl pyrophosphate to triethyl orthophosphate in the extractive may be determined by (a) direct separation through vacuum distillation, (b) refractive index determination (if all traces of solvent are removed) or (c) titration with standard alkali of the diethyl orthophosphoric acid produced by hydrolyzing the teraethyl pyrophosphate without effecting hydrolysis of the triethyl orthophosphate. Experiment has shown us that method (c) gives the most conveniently reproducible results and this was therefore selected as a basis for tetraethyl pyrophosphate analysis.

Procedure

TWO grams of sample is weighed out to the nearest milligram by means of a weighing pipette into a dry 125 ml. Erlenmeyer flask and the

flask is immediately stoppered. The stopper is removed and approximately 30 grams of finely crushed ice are introduced. At this moment, the time is noted or an interval timer set for 60 minutes is turned on. After introduction of the ice, a strip of Congo Red paper is introduced and, while swirling the flask, the solution is neutralized with saturated sodium bicarbonate solution which is added rapidly. The flask is then left to stand. In warm weather it may be necessary to place the flask in the refrigerator during the 60 minute standing period. At the end of this period 20 ml. of chloroform are added at once and mixed by a swirling motion. The contents of the flask are then quickly transferred through a funnel to catch small ice crystals into a 125 ml. separatory funnel. An additional 10 ml. of chloroform is used to effect a quantitative transfer and to wash the ice crystals. The lower chloroform layer becomes clear in about 30 seconds when it is drawn off into a 250 ml. Erlenmeyer flask. Care should be taken not to allow any of the acidic aqueous layer to get to the bore of the stopcock. The aqueous portion is then quickly extracted (using only moderate shaking) successively with two 10 ml. portions of chloroform. The flask containing the combined extracts is then placed on the steam bath. Two glass beads are added and the chloroform is removed which takes 10 to 15 minutes.

To remove traces of chloroform 10 ml. of 95% ethyl alcohol is

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Agricultural Research
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Agriculture
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added, washing down the sides of the flask during the addition. A short glass tube (attached to a water aspirator or other source of vacuum) is then inserted about half way into the flask to effect turbulence of the vapors while heating is continued for a minute or two longer. The flask is then removed from the steam bath, approximately 100 ml. of warm distilled water introduced, and then placed in an oven at 50°C. ($\pm 2^\circ$ C.) overnight (17 hours). In the morning the accumulated samples are titrated with standard alkali solution (0.1 to 0.15 Normal). No error is introduced by prolonging the 50° heating beyond 17 hours.

Discussion of Method

In carrying out the hydrolysis it was found that a period of 60 minutes at 0°C. was a sufficient time interval to hydrolyze all ethyl metaphosphate and constituents other than triethyl orthophosphate and tetraethyl pyrophosphate. The hydrolysis of the interfering substances, although not complete, is evidently sufficient so that they are not appreciably extracted by chloroform. A much shorter time interval than this might be used if it were feasible to carry out the hydrolysis at room temperature before starting the extraction procedure. However, shortening the time interval by raising the temperature appeared not to be feasible, because of the variable heat of reaction on addition of the water, the temperature rise being roughly proportional to the ethyl metaphosphate content of the sample. When ice is

added, the heat of reaction is absorbed by the melting of the ice, so that under these conditions the temperature of hydrolysis is reproducible. At 0°C. the rate constant for hydrolysis of tetraethyl pyrophosphate is 3.5×10^{-4} reciprocal minutes (1). Substituting this value in the first order reaction equation gives for an interval of 60 minutes 2 percent hydrolysis of the active ester during this period. In the final assay figure a corresponding correction must be made to take into account the 2 percent lost by hydrolysis.

In the extractive it is necessary to hydrolyze substantially all of the tetraethyl pyrophosphate so that it may be determined as diethyl orthophosphoric acid by titration with standard alkali. This operation must be carried out under conditions that do not promote hydrolysis of the triethyl orthophosphate which also breaks down—particularly under alkaline conditions—to diethyl orthophosphoric acid. Trials have shown that these objectives may be accomplished by 17 hours hydrolysis at 50°C. of the extractive. At this temperature and time interval the tetraethyl pyrophosphate is 99.9+% hydrolyzed while the triethyl orthophosphate is not appreciably hydrolyzed and hence does not affect the titration result.

Pure tetraethyl pyrophosphate placed in ice-water solution and extracted at once by chloroform in three portions in the same standard as was applied in carrying out the assay method is recovered to the extent of 98.5% by weight. A correction factor of 100/98.5 will therefore take care of the partition loss. The total correction factor is thus:

$$100/98 \times 100/98.5 = 1.036$$

Two moles of diethyl orthophosphoric acid (a strong monobasic acid) are formed for every mole of tetraethyl pyrophosphate which has a molecular weight of 290.2. Percent tetraethyl pyrophosphate may therefore be expressed as follows:

$$M_1 \text{ of NaOH} \times \frac{1}{2} \text{ Normality} \times 290.2 \times 1.036 \times 100 \div \text{Wt. of sample}$$

sample in mgs. The above equation reduces to:

$$\begin{aligned} \% \text{ Tetraethyl pyrophosphate} \\ = M_1 \text{ of NaOH} \times \text{Normality} \times 15.04 \\ \div \text{Wt. of sample in grams.} \end{aligned}$$

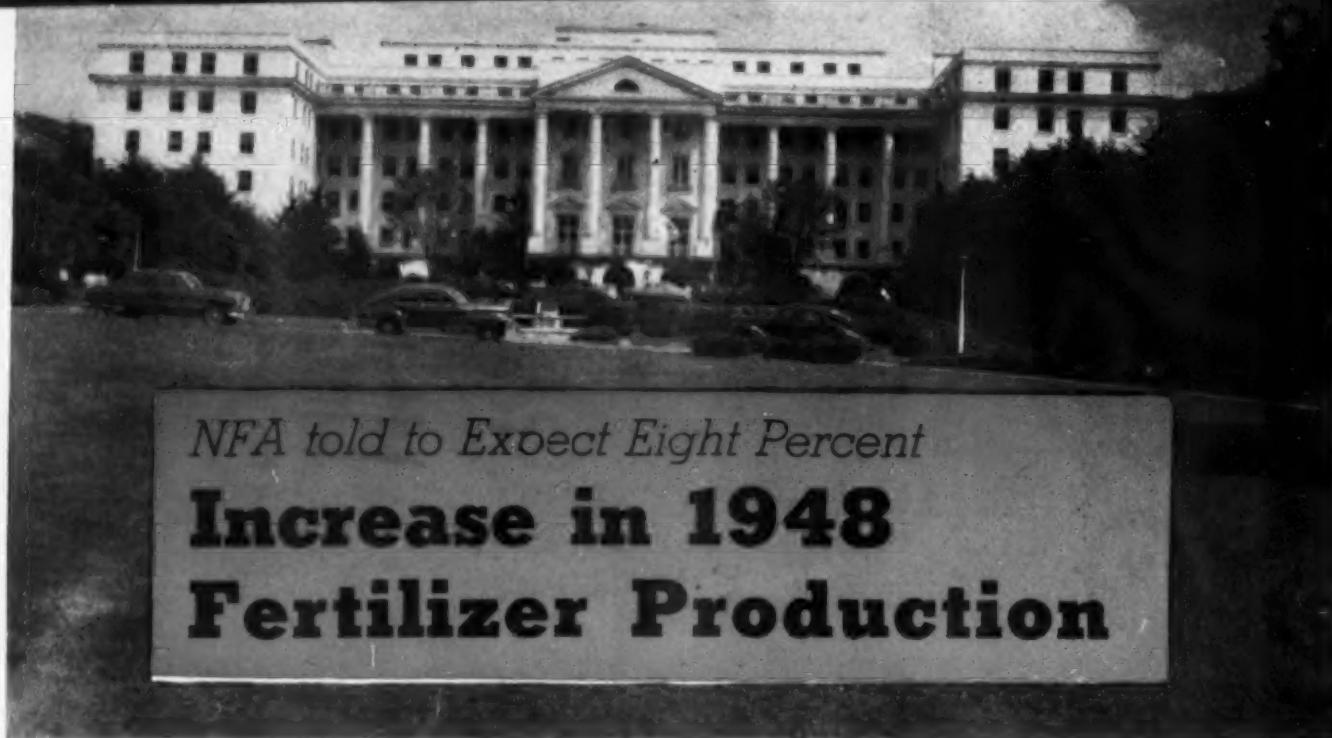
It is not advisable to take a sample weight much below one gram because of the relatively greater error introduced in very small samples by atmospheric moisture hydrolysis during the period that the sample is weighed out and pre-cooled to 0°C. i.e. before commencing the controlled hydrolysis period.

A summary of assay results as applied to typical products obtained by methods given in equations 1, 2, 3 and 4* and also to highly purified tetraethyl pyrophosphate are given in Table 1. It is to be noted that the addition of triethyl orthophosphate to the extract of sample 1-A did not significantly affect the assay figure as compared with the assay of sample No. 1 taken from the same lot of product. Results by chemical assay and bioassay have shown a close correlation.★★

References

- (1) Hall, S. A. and Jacobson, M. "Hexaethyl Tetraphosphate and Tetraethyl Pyrophosphate" presented at the 112th meeting of the American Chemical Society in New York City, September 1947.
- (2) Schrader, G. German Patent 720,577 (1942) to I. G. Farbenindustrie, A.G.; U.S. Patent 2,336,302 (1943) vested in the Alien Property Custodian.
- (3) Woodstock, W. H. U.S. Patent 2,402,703 (1946).

* Since this paper was submitted for publication the authors wish to report the following modification which lends more precision to the method: In place of 1.5 hours heating at 100°C. of the extractive to effect 99% hydrolysis of the tetraethyl pyrophosphate it has been found better to hydrolyze at approximately 50°C. in an oven set at this temperature for 17 hours (overnight). No error is introduced by prolonging beyond this time. In this way 99.9% or better of the tetraethyl pyrophosphate is hydrolyzed to diethyl phosphoric acid; the total correction factor is thus correspondingly lowered from 1.046 to 1.036. In carrying out the 50° hydrolysis procedure one should remove the chloroform from the extract as described, i.e. on the steam bath, and finally remove the last traces of chloroform by inserting a glass tube (attached to a water aspirator or other source of vacuum) about half way into the flask on the steam bath for a period of about a minute. Approximately 100 ml. of distilled water is then added and the flask placed in the oven for the overnight heating at 50°C. In the morning the accumulated samples can be titrated directly with 0.1 to 0.15 N standard alkali.



NFA told to Expect Eight Percent
**Increase in 1948
Fertilizer Production**

THE National Fertilizer Association held its 23rd Annual convention at The Greenbrier, White Sulphur Springs, W. Va., June 21-23. Speakers representing the U.S. Government; Agricultural Experiment Stations; the farm press; and the National Grange appeared on the program which included in addition the annual addresses of the Association president and board chairman; Maurice H. Lockwood and Weller Noble, respectively. A color movie dealing with the role of copper in plant and animal nutrition was presented on Monday evening, and the annual NFA banquet was held Tuesday evening, with Elbert N. Carvel, Lt. Governor of Delaware, toastmaster.

In his annual convention address, Mr. Noble reviewed the Association's activities of the past year, pointing out the part played by the group in the fertilizer industry's attainment of new production figures during the war and post-war years. He said that the NFA is now in a position to render the best service in its history. Mr. Noble lauded the holding of conventions, stating that they are necessary from at least three standpoints: to report the activities of the association; to develop programs stressing education and progress

with emphasis on agriculture; and the promotion of friendships.

Since Mr. Noble's chairmanship was to end with the convention, he thanked the board of directors for their cooperation during his term of office, and introduced the board members to the assembly.

The Hon. A. L. M. Wiggins, Under-Secretary of the Treasury, told the NFA that the fertilizing industry, along with other industries, can face the future with far more confidence than business could after World War I. In his talk, "Some Present Economic Considerations," he contrasted conditions in the U.S. following the late war, with the economic setup in the early 1920's, following the first world war. He commended the fertilizer industry for both its production, and for the fact that fertilizer prices have not risen nearly as high as the average increase in other manufactured goods in the U.S. He said that the fertilizer industry has set an example which could well be followed by other industries.

The under secretary drew numerous parallels between the 1920 boom period and the present time of high prices and inflationary tendencies. The farm situation, he stated, is far different than it was 28 years ago. The rise in prices in 1920 came

on top of a long protracted price advance, whereas following World War II, the rising prices followed a period of deflation. He said that there is not as much speculation now as there was in the 20's and that farmers are not burdened with the heavy debt which characterized the former period. And this despite the fact that farm land prices advance 102 percent from 1939-48 as compared to 78 percent from 1912-1920.

If we can prevent further advances in commodity prices, he declared, the indications are that there is little danger of a precipitous decline in farm prices. This does not mean that there will be no adjustments, he pointed out, and said that there are great marks of difference between "adjustments," "recessions," and "depressions." By way of illustration, Mr. Wiggins observed that in a period of adjustment one tightens his belt; in a recession he has no belt to tighten; and in a depression he has no trousers either.

Following the lessons learned in heavy production schedules on the farm, Mr. Wiggins expressed doubt that the farmer will ever return to "mining his soil, nor follow practices which are not in keeping with good conservation methods." He declared that agriculture is the foundation on



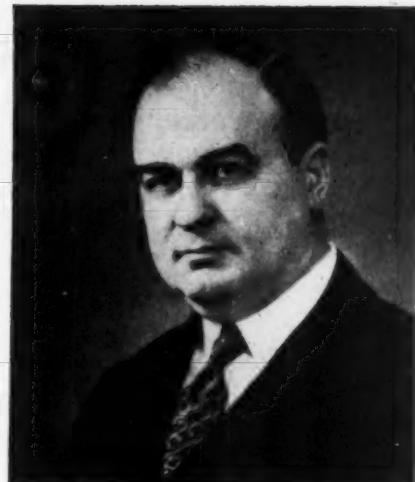
Dr. Robert E. Yoder

Describes soil conservation efforts in State of Ohio . . . fertilizer needed in many section to rehabilitate soils.



A. L. M. Wiggins

Under-Secretary of the Treasury states that agricultural conditions following World War II are far better than those of 1918.



Howard W. Selby

Condemns farm practices which "mine" land . . . says that soils are being destroyed faster than we can replace them.

which world stability and world peace may be built. "Food," he said, "is the key shortage in the world." Fertilizer production is one of the most important links in correcting this shortage.

In an explanation of soil conservation practices in Ohio, Dr. Robert E. Yoder, chief of the agronomy department of the Ohio Agricultural Experiment Station, Wooster, told the convention that since it is from the soil that the basic necessities of life are derived, the maintenance of soil productivity is of vital significance to all levels of society. He pointed out that a sound conservation program touches not only the relatively few farm families in the nation, but is of vital importance to every person.

He declared that the door is open for not only the sale of fertilizer in many new parts of the country, but a continuous sound program of conservation education must be "sold" in order to provide the nation with the food and fibre it needs. To

illustrate the need for further conservation, he pointed out that a large percentage of the extra crop yields which enabled the nation to feed itself and others, was grown in a small group of midwestern states where the soil had not been depleted as badly as it had been in some older parts of the nation. Dr. Yoder presented charts showing the constant depletion of soil nutrients in Ohio, and the amounts of fertilizer which would be necessary to bring the soil back to its full fertility.

"Plant Food Cooks"

A DEMONSTRATION of how various necessary elements are made available to the soil, was presented by Dr. H. B. Siems, chairman of the Plant Food Research Committee. Dressed as a chef, Dr. Siems demonstrated the physical properties of phosphorus, iron, copper, zinc, magnesium, potassium, calcium, sulfur, and boron, explaining the chemical reactions through which the elements were changed into forms in which they would be available to growing plants. The demonstration



L. E. Little, E. Rauh & Sons Fertilizer Co., Indianapolis, Ind.; A. A. Schultz, Reading Bone Fertilizer Co., Reading, Pa.; and Elbert N. Carvel, Valiant Fertilizer Co., Laurel, Del., have a good chuckle as they recall events of the previous evening's banquet at which Mr. Carvel was toastmaster.

showed why the pure elements cannot be used as fertilizer, and pointed out the necessity of furnishing the correct balance of materials for plant and food use.

As an entertaining change of pace, the speaker at the annual banquet Tuesday night urged his listeners to "take life easy." On this premise, the speaker, William Hazlett Upson, launched out with a vigor

Lockwood to New Post

Maurice H. Lockwood, president of the National Fertilizer Association, has accepted a position with International Minerals and Chemical Corp., Chicago, it was announced at the N.F.A. convention at White Sulphur Springs, W. Va. Mr. Lockwood will succeed Harry B. Baylor, retired, as vice-president of the corporation in charge of the Plant Food Division.

The name of Mr. Lockwood's successor was to be announced at a later date. Chairman Weller Noble stated at the convention that a committee of the Board consisting of Ray L. King, chairman, J. W. Dean, Mr. Noble, C. T. Prindville, C. D. Shallenberger, and J. E. Totman had been appointed to select a qualified person for the Association presidency. In the meantime, Fred S. Lodge, Mr. Lockwood's assistant, was to serve as acting president.

Mr. Lockwood became president of the NFA two years ago, following many years of close association with the group. Before accepting the presidency, Mr. Lockwood had served as chairman of the board of directors. He has been in agricultural service during his entire business life. After being graduated from the University of Connecticut, he worked as a county agent, then manager of a farmers' cooperative fruit marketing association, and then for two decades as fertilizer research manager of the Eastern States Farmers' Exchange. During the war, Mr. Lockwood was a member of the Fertilizer Industry Advisory Committee which worked closely with Government agencies in advising them with respect to the Nation's fertilizer policies.

In addition to authoring numerous articles on fertilizers and their use, Mr. Lockwood is well known among agronomists and soil chemists of the U.S., and is an authority on the plant food situation throughout the world. In 1935 he attended the International Soil Conference at Oxford, England, and has traveled in Europe and Central America extensively.

He holds memberships in the American Association for the Advancement of Science; the American Society of Agronomy; the American Chemical Society, and the International Society of Soil Science.



J. T. SANDERS

Expresses views of National Grange regarding fertilizer production and its part in soil rehabilitation.

which belied his easy-going philosophy. He told how he had discovered that by "resting" nine tenths of the time, one's energies are conserved by the preceding rest, and he is able to do a better job when he does work.

Mr. Upson, author of numerous Saturday Evening Post short stories defended "ergophobia" (aversion to working) as a "gift" rather than a disease.

Eight Percent More in '48

In the general meeting of Wednesday, under the chairmanship of Mr. Noble, president Lockwood in his annual address told the assembly that barring strikes, transportation stoppages or other handicaps, and if agricultural income remains relatively high, "we can with reason look for another eight percent increase in volume for the coming year." He quoted the recent U.S.D.A. fertilizer consumption figures, and expressed the hope that no change in average concentration will take place during the coming fiscal year.

The nitrogen situation was discussed by Mr. Lockwood who said that the unfilled demand amounts to about 30 percent for all fertilizer nitrogen and 35 percent for solid nitrogen for direct application use. "If we assume that this year's fertilizer nitrogen supply for the U.S. and its possessions is 850,000 tons of N, the unfilled demand is 255,000 tons of nitrogen. Similarly, if the nitro-

gen used in direct application materials is 340,000 tons, then we might as well have had 119,000 tons more of nitrogen in solid form for such use," he said.

Regarding the disposal of ordnance plants now producing ammonium nitrate, Mr. Lockwood reported that the NFA has urged that these plants be sold or leased to proprietary operators in order to lessen the tax load, make possible more economical operation and increase their output, and permit their fitting into the domestic supply picture when the army no longer needs their output for export.

In commenting briefly upon his resignation from the presidency of the NFA, Mr. Lockwood thanked the association for its cooperation, and stated that in his new position he wanted to be "continually mindful of the welfare of the . . . association and the industry."

The probable use of fertilizers in a suggested soil and water use program was discussed by J. T. Sanders, legislative counsel for the National Grange in his talk Wednesday morning. Dr. Sanders called attention to the continually increasing population of the world, and how this observation has worried philosophers for centuries. He said that at the present time, the world is in the era of meeting this increased food-population pressure, and soil and water conservation plus greatly increased use of commercial plant food are to play major roles in solving the problem. The "important and expanding role of fertilizer calls for broad gauged long-time vision and planning on the part of the industry," he declared, and added that "if the industry falls short of this vision and the necessary expansion, Government assistance must, of necessity be brought into play."

He pointed out the unmatched soil and water resources of the U.S. "Many of these soils so richly endowed with necessary minerals . . . could not, under past prices of fertilizer and grain, utilize fertilizer economically," he said. "Even now these rich endowments of the minerals of

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N. A. I. D. M. Group Discusses Labeling Problems

DETAILED instructions for recommended registration procedure under the new Federal Insecticide, Fungicide and Rodenticide Act were outlined by W. G. Reed, chief, Insecticide Division, Livestock Branch, U.S.D.A., in a talk before members of the National Association of Insecticide & Disinfectant Manufacturers, meeting at Spring Lake, N. J., June 15. Mr. Reed reviewed some of the common errors in submitting applications for registration, such as failure to read and follow instructions, failure to submit duplicate copies of labels and labeling, use of trade names or abbreviations in specifying ingredients rather than the exact chemical names, inadequate use directions, failure to specify types of insects which the product is intended to control, use of unwarranted terms or expressions which are too inclusive, etc.

Turning to specific classes of products covered by the new law, Mr. Reed had the following to say with reference to fungicides, weed killers, and agricultural insecticides:

Fungicide labels as a group are in excellent condition. This is probably the result of careful review under the Insecticide Act of 1910. Herbicides, or weed killers, coming under the Act for the first time, have presented a number of problems. The ingredient statement of fungicides and herbicides should show the true chemical names of the ingredients. Trade names of products are not acceptable for names of active ingredients. Products containing copper should show the source or origin of the copper, since the fungicidal activity of copper is associated with the soluble copper content. When copper is

present in the form of compounds of definite composition, the name of such compounds should be given—such as, yellow cuprous oxide and copper sulphate. When copper is present as an indefinite compound, the copper is to be expressed as metallic and the source of the copper given—such as, copper (in basic copper sulphate) expressed as metallic. If the name of the fungicide indicates the source of the copper, such as bordeaux mixture or copper carbonate, the active ingredient would be stated as copper expressed as metallic. For herbicides containing sodium arsenite, the chemical name "sodium arsenite" is preferred over the name "arsenic trioxide." Those containing 2,4-dichlorophenoxyacetic acid should give the form of the chemical present. If the 2,4-D product contains the free acid or is a mixture of the free acid and sodium carbonate, the active ingredient is expressed as the acid, whereas if it is present in the form of sodium salt, amine, or ester, the true chemical name should be given with the equivalent amount of the 2,4-dichlorophenoxyacetic acid also stated as a footnote. When herbicides contain a mixture of the ethanolamine salts, the active ingredients should be expressed as ethanolamine salts of 2,4-dichlorophenoxyacetic acid with the percentage of 2,4-dichlorophenoxyacetic acid also given. The name "alkanolamine salt of 2,4-dichlorophenoxyacetic acid" is too indefinite.

The front panel of the label of a fungicide should contain the names of the principal crops on which it is intended to be used and of the diseases that are to be controlled. Herbicide products should likewise contain the names or types of weeds that are to be

controlled or the places or crops where weeds grow that are to be controlled. It is not expected that all crops and their diseases or weeds to be controlled would be given. Broad claims for fungicides—as "For use on fruits, vegetables, and ornamentals"—would not be acceptable, while statements such as control of "peach leaf curl," "apple scab," tomato late blight," "tobacco wildfires," and similar terms are acceptable. Herbicides claiming use "Against all lawn seeds" or "Control of annual and perennial weeds in grain fields" are to broad and should be modified. The claim for 2,4-D products, "Does not harm common grasses," is too broad since bentgrass and St. Augustine grass are injured by 2,4-D. The top growth of perennial weeds as Canada thistle, leafy spurge, and garlic may be killed by one application of 2,4-D but repeat application for one or more years should be suggested on the label to kill the roots and underground stems of these hard-to-kill weeds. The label should suggest that care must be used to avoid saturation of the ground with 2,4-D chemical, since excessive amounts in the soil will inhibit for a short time the growths of crops planted later.

Precautionary statements to warn of the hazards in the use of fungicides and herbicides on agricultural crops are receiving considerable attention. Fungicides containing sulphur, or lime and sulphur, should bear a warning of possible injury when used on fruit trees in a spray or dust schedule during hot weather. To avoid injury to the crops, such sulphur products are not to be used on apple foliage or fruits within 10 to 15 days or longer, depending on the location, before or after an oil spray. Copper fungicides are not to be recommended for early season sprays or dusts in apple orchards because of the danger of causing fruit russet on copper-sensitive varieties. Contact herbicides as oils, sodium arsenite, and sodium chlorate should contain a warning not to apply them to desirable plants or near roots of such plants. Herbicides containing 2,4-D will injure susceptible desirable broadleaf plants with which it comes in contact and ade-

(Turn to Page 71)



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Chaotic Situation Described by DEALERS in CHEMICALS

STORIES of confusion in the fields of insecticides, fungicides and weed killers, and of shortages in the fertilizer business were on the lips of nearly all of a group of Virginia dealers and manufacturers contacted by *Agricultural Chemicals* in June. These dealers, selected from subscribers in the area, comprise but a small portion of the total, of course, but the basic ideas underlying what they had to say were so consistently similar as to be of significance.

When one speaks of new organic insecticides to a dealer, the dealer is likely to throw up his hands in a gesture of resignation and say, "we try to keep up with them, but it's no use. The growers are all mixed up, and so are the dealers." The same is true in lesser degree with fungicides, they say, but in weed killer chemicals, neither dealers nor consumers know very much about proper usage. As one dealer remarked, "I thought I knew quite a little about 2, 4-D until the other day I read that the same material may be used to stimulate a plant as a hormone, and that a slightly different dosage will kill the same plant. It is awfully hard for a farmer to know exactly how to use weed killer chemicals."

To sum up most of the opinions held by this group of Virginians in the agricultural chemical business, they feel that much more education is needed before these new organic materials may be used to their maximum benefit, and without the severe penalties brought on by errors in their use. The education must be of a down-to-earth variety, as contrasted with the sometimes over-

Virginia dealers report great confusion in field of new organics . . . suggest central clearing house for names and uses of numerous products

enthusiastic claims made by salesmen in the field. It must be made available to both user and dealer, but particularly to the dealer who can and should be the one from whom buyers may receive honest information about what a given product will and will not do. Users want to know how toxic the material is to the person doing the spraying or dusting, and if, in killing the insect pests, it may also harm the

plant or leave toxic residues on edible fruits, etc. Since most new pesticide preparations possess strong specificity in their actions, users naturally want to know just what insects may be controlled by this or that brand. And they want to know more about plant disease control as well as further information about weed killers.

That the dealers and manufacturers contacted were sincere in their quest was obvious. They realize their responsibility fully and wish that something might be done to lessen the confusion existing at the present time.

Typical of dealers was W. L. Overton, proprietor of the W. T. Wood & Sons Co., Richmond. He stated that his firm is selling 2,4-D in "big volume" not only to farmers in a wide area surrounding the Virginia Capital, but that certain large manufacturing plants were making use of the material to control weed growth on their grounds. Mr. Overton predicts that weed killers will become "the greatest seller in the agricultural chemical field" within a few years. He felt, however, in common with other dealers, that the public is not at all sufficiently educated to handle 2,4-D in varying situations, but that the experience of a couple of seasons should form a suitable background for further use.

Sales of insecticides have more

To Lessen Confusion . . .

The article by Dr. S. E. A. McCallan, "What the Dealer should know about Fungicides" appearing in this issue, should be of value in helping to correct the situation described in this interview-travelogue.

This article will be followed by "What the Dealer should know about Fertilizers," by Dr. Colin W. Whittaker; and in subsequent issues, similar articles covering the fields of weed killers and insecticides.

Not only dealers in these agricultural chemicals, but salesmen, manufacturers, mixers, repackers and others in the field should find these "down to earth" articles helpful.

than doubled in late years, Mr. Overton stated. Over-all sales on DDT as such have fallen off to a degree, but this has been more than offset by an increase in use of the arsenicals against beetles and aphids which comprise the worst pests in that area. Regarding the confusion in the insecticide field, Mr. Overton thought that more standardized nomenclature would help the general situation and would prevent duplication of the same preparation under numerous trade names.

Somewhat the same comment was received from H. M. Van Wormer, Richmond, who operates an extensive tree service which includes the use of sprays and dusts in large quantities. He looks upon the confused insecticide situation as being the fault of no one, but rather the natural result of many new products being placed on the market before either dealers or users have had a chance to evaluate them or get them straightened out in their minds.

Because of this lack of accurate knowledge, Mr. Van Wormer said, some dealers are not acquainted with the timeliness of spraying for control of certain pests. This is reflected in their advertising, he notes, which when inaccurate, tends to throw the consumer into an even greater state of confusion. The dealers are the most important link between the manufacturer and the users, he said. A standardization of names or a clearing house through which all such problems may be referred, would be of great help.

Rodney Berry, of the Virginia Department of Chemistry, commented that the new organic insecticides provide the "most confusing subject in existence" from a law enforcement standpoint. He related some of the problems his department has experienced in developing an adequate and equitable state insecticide act to cover the wide range of the subject. Difficulties in labeling, in describing antidotes, in stating correct usage have all had a part in the over all problem, he said. Economic losses caused from improper use of various agricultural chemicals will bring a public demand for safety, he believes. But it may be some time yet before the difficulties are ironed out.

Fertilizer Sales High

ASIDE from the severe shortage of nitrogen, fertilizer manufacturers have but little complaint about current conditions. P. C. Lewis, production manager of the Bone Dry Fertilizer Co., Richmond expressed optimism about the future in fertilizer consumption. Right now, his company could sell a great deal more material than it is moving, were materials available, particularly nitrogen. He doubts that farmers in that area will ever cut back to their former skimpy use of fertilizer, now that they have seen the outstanding benefits of more liberal application. He told of one farmer who for a number of years had applied fertilizer at the rate of only 100 pounds per acre to his lands, with understandably inferior results. With better market prices, he was encouraged to increase this to around 800 pounds per acre, and results were astonishing. Now that the benefits have been proved to him, and to hundreds of others, it is unlikely that any of them will ever return to such scanty plant food fare.

Mr. Lewis reported that use of fertilizer on corn is on the increase. For this, a 5-10-5 grade is often employed at the rate of from 400 to 800 pounds per acre; and the results are arousing the interest of skeptics who didn't think much of the idea previously.

The range of application is a wide one in Virginia, says Mr. Lewis. It runs from 400 to 1,500 pounds per acre, on truck farms in a 5-10-5 grade. On grain, two grades are used: 3-12-6 and 4-12-4. Tobacco growers use a 3-9-6 grade, at from 800 to 1,500 pounds per acre. The quick turnover of tobacco is a factor in this relatively heavy application of fertilizer. The Bone Dry Co. distributes fertilizer only in the State of Virginia, although it ships lime across the state line.

A branch office of the W. T. Rawleigh Co. is at Richmond, where farm chemicals form an important part of the total volume of business. Sales manager Joseph Houska, Jr., in commenting on the general situation reiterated the state of confusion into which the agricultural chemical field has drifted. He said that much of

the literature on the new organic insecticides is frankly over the heads of most dealers and salesmen, and they are the ones who need information more than anyone else. A great many users look to the salesman for guidance, he said, which emphasizes the importance of their being well read on latest developments.

An optimistic outlook for the fertilizer industry was predicted by W. B. Badenoch of the Richmond Guano Co. Although regretting the current shortages of materials in the trade, he considers the future possibilities as very encouraging. The increase in manufacturing facilities throughout the country is bound eventually to catch up with demand, he said, and by that time the heavy export schedule of fertilizer materials under ERP will be greatly curtailed. Like other fertilizer industry spokesmen, Mr. Badenoch predicted that the demand for fertilizer materials in the U. S. is likely to remain high for a long time. Even if farm commodity prices decline, he said, the farmers have seen enough of the value of fertilizer, so that they won't quit using it in substantial volume.

A thriving branch of the Southern States Cooperative is at Bedford, Va., with J. D. Cock in charge. Like other dealers, he, too, has had difficulties with the fast-changing scene in the agricultural chemical field. He stated that the continual barrage of new recommendations for pest control has obliged the dealer to stock numerous insecticidal products, many of which are for overlapping uses, and some of which are not likely to move from shelves because of their being superseded by newer preparations.

The confusion of names is also a source of bewilderment, Mr. Cock reported. He told of one firm which ordered a large stock of insecticidal material, only to find that it already had an ample supply on hand under a different trade name. If some means could be found to standardize the nomenclature of such products, it would simplify the dealers' worries, Mr. Cock believes.

Because of the uncertainty of demand, he mentioned, manufacturers are naturally reluctant to produce
(Turn to Page 75)

New Books . . .

The insect guide, orders and major families of North American Insects.

Ralph B. Swain, with illustrations by Suzan N. Swain, Pages i-xlvii, 1 261, with illustrations (330 in color), 1948. Doubleday and Company, Inc., New York. Price \$3.00.

MANUFACTURERS of insecticides, insecticidal chemicals, devices for their use, and those who market and distribute such materials are perhaps all too willing to emphasize and accept the complexity and significance of the part they play in insect control. It is axiomatic, however, that any sound, continuing program of pest control requires familiarity with the pest and acquaintanceship with its relatives and allies. This means at least elementary knowledge of the pests themselves and the relation they have to the numerous other insects which may frequent the same area. Many kinds of insects are beneficial, and some even do more good than the more destructive ones do harm.

Distinguishing the beneficial from the harmful or segregating into their proper place those which have little or no direct known relation to our economy is a task for the taxonomic entomologist. Everyone interested and concerned with insect control, however, should have some information on insects—the more they have the better they can contribute to the job of insect control.

"Getting Acquainted with Insects" could well have been the title of the little book just published for the Swains under the title "The Insect Guide" by Doubleday and Company. Illustrated by more than 450 pictures, of which 330 are in color, with a non-technical text, it provides the simplest means yet presented of becoming acquainted with insects. More than this, the arrangement encourages use. A background of knowledge is not

required to find the corn earworm and brief statement in the text. Here the reader learns that this species injures other economic plants and is also known as the tomato fruitworm, cotton bollworm, and tobacco budworm. One can easily learn to recognize some of the beneficial groups. The excellent picture of a braconid wasp provides easy reference to the text. Here the significance of this group of parasites is briefly discussed and the reader learns that the example selected for the group is the well-known destroyer of the Oriental fruit moth.

Fundamentals of development are simply explained. The three basic types of metamorphosis—none, incomplete, and complete—are more simply referred to as direct, gradual, and complex development. Non-technical words are used to tell what the adults look like and how they behave. The immature stages are discussed under the brief, more direct heading "young." The general economic significance of each major group is explained under the simple heading "importance." Here suitable examples are given of the better-known economic members of the group. Frequently there is information as to their native home, together with notes which explain why some commodities are excluded entry into the United States, because they may be infested with injurious insect pests.

The aims and purpose of the book are to provide simple, ready means of becoming acquainted with the major groups of insects. This it does in a way easily understood. The book does not seek to provide for a key for the recognition of individual species nor to discuss their importance. The principle of illustration, however, has been effectively used in the text. It includes references to many of the better-known insect pests and their economic importance. The sugar cane moth borer is said to cause annual loss of \$6,000,000, the boll weevil

\$200,000,000, lyctid beetles \$20,000, 000—to mention only a few.

The illustrations are excellent. The text is well planned and written in a simple, pleasing and direct style. The authors and publisher are to be congratulated on preparing a text which should greatly aid in an understanding and appreciation of our friends and enemies—the insects. Those concerned with producing or distributing materials and devices for insect control will do well to use this simple, well-organized handbook.

S. A. Rohwer

Insects Unnecessary— Bromfield

LOUIS Bromfield has written another book, "Malabar Farm." And for his effort, American agriculture owes him a debt for trying to solve its problems in one fell swoop. He compares agriculture to prostitution, not altogether unfavorably to prostitution, but gives the nod to agriculture as the most aged of all professions. He refers to "whorish, greedy, ignorant agriculture," and to the evils of "parasitic agriculture." Our agriculture was and is largely unproductive and inefficient, says Senor Bromfield. (Cornell, Iowa State, Purdue, Illinois, Rutgers, et al, make a note of this.—Ed.)

And the fact that "whorish agriculture,"—the author uses this designation repeatedly,—stoops to the use of chemicals to control insects and plant disease apparently troubles Pal Louis no end. Were the soil in proper condition, insect and disease-free agriculture would find no need for insecticides or fungicides, he contends. He tells of the soil expert he met who knew nothing of enzymes and little of trace elements. He is terrified by the growing population of the world and the problem of feeding it. (Apparently, during the late war, with a large number of our world farmers in uniforms or their farms incapacitated for one reason or another, what was left of "whorish agriculture" did pretty well in staving off worldwide starvation.—Ed.) After a 46 day drought at Mr. Bromfield's Ohio

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Invasion in 1948?

Grasshopper Problem Increases

Claude Wakeland

Division of Grasshopper Control
Bureau of Entomology and
Plant Quarantine
U. S. Department of Agriculture

DURING the war and the immediate period thereafter, the United States was extremely fortunate in having a combination of conditions unfavorable to grasshopper increase and survival, but very favorable for maximum crop production. This year, for the first time since 1939, large contiguous areas in midwestern and southern plains states are showing marked increases in grasshopper populations. Extensive crop losses are likely unless farmers make materially greater total efforts at control than they have made during any of the past seven years. Although late spring predictions were that there would be another bumper wheat crop this year, prospects now are that production could be seriously curtailed, for grasshoppers are on the march again!

Following 1939, the last major outbreak year, the grasshopper population was reduced yearly and the infested area receded in size until 1943. During the period 1944-1947 the total grasshopper problem, although greater than in 1943, remained about the same from year to year. It is true that during that period rather extensive outbreaks occurred in several different states or areas but they were compensated for by population reductions elsewhere. The species

Early hatching of grasshopper eggs made possible by dry weather which also slowed early maturity of grains. Serious infestations already noted in some western areas

Melanoplus mexicanus (Sauss.), which was predominant in most of the upper plains states in the 1939 outbreak, was reduced in population until it was of secondary importance in nearly all areas. In several recorded instances when economic populations of first instar nymphs were wiped out by prolonged cold or wet weather, mortality occurred over wide areas. Apparently, the years of increased moisture which stimulated maximum crop production were unfavorable to *M. mexicanus*. Conversely, these same conditions were favorable to the increase and spread of *Melanoplus differentialis* (Thos.) for it extended its habitat from about central South Dakota throughout the length of the Missouri River Valley in North Dakota and into the drainage area of the Yellowstone River in Montana. This species has for several years been the dominant one in the central and eastern parts of Texas, Oklahoma,

Kansas, Nebraska, South Dakota, and southeastern Montana.

Melanoplus femur rubrum (Deg.) and *Melanoplus bivittatus* (Say) have been dominant in certain rather extensive areas in the Plain States and in other states. Because of the more restricted habitants or egg-laying habits of *M. differentialis*, *M. femur rubrum*, and *M. bivittatus* the populations do not coalesce into general wide-scale outbreaks. On the other hand, *M. mexicanus* feeds and oviposits in crop, idle, and range lands, and attacks diverse crops and range plants. When it increases in numbers, increases are likely to occur simultaneously over very extensive area and in widely varying habitats.

The grasshopper egg survey in the fall of 1947 revealed the first general increase in the population of *M. mexicanus* that had been detected since the population cycle of the species had shown abatement in 1939.

Surveys showed that *M. mexicanus* had increased over a broad general area comprised of northern Texas, western Oklahoma, western Kansas, eastern Colorado, western Nebraska, eastern Wyoming, western South Dakota, and southeastern Montana, and that increased populations of this especially destructive species would destroy crops this year unless the potential population were reduced by control, weather, disease, predators, or parasites.

The recent favorable crop production years have been characterized by early spring plant growth and abundant moisture extending through the month of June. Grasshopper eggs have been late in hatching, and the predominant species have been those which develop late. Consequently, grain crops have generally matured before they were attacked by grasshoppers, and grasshopper injury has occurred mainly on late maturing crops.

As the date this manuscript is written (June 21, 1948), an apparent reversal has occurred this year. Early dry weather and resultant scarcity of shading ground-cover was favorable to early hatching of grasshopper eggs. Spring growth of grain was retarded and there is the probability that grain crops in many areas will be attacked by grasshoppers before they can set

or mature grain. This situation is aggravated by the fact that, this year, grasshopper populations have been affected very little by natural mortality, and severe drought is seriously reducing plant growth over several extensive areas.

Simultaneously with the described increase of *M. mexicanus*, Texas and Oklahoma are in the midst of the heaviest outbreak of *M. differentialis* encountered since the last general grasshopper outbreak in the United States in 1937 to 1939. Large localized infestations of *Cannula pellicula* (Scudd.) are being fought by counties and other agencies cooperating with the Bureau of Entomology and Plant Quarantine in California, South Dakota, Montana, and Utah. An important companion infestation

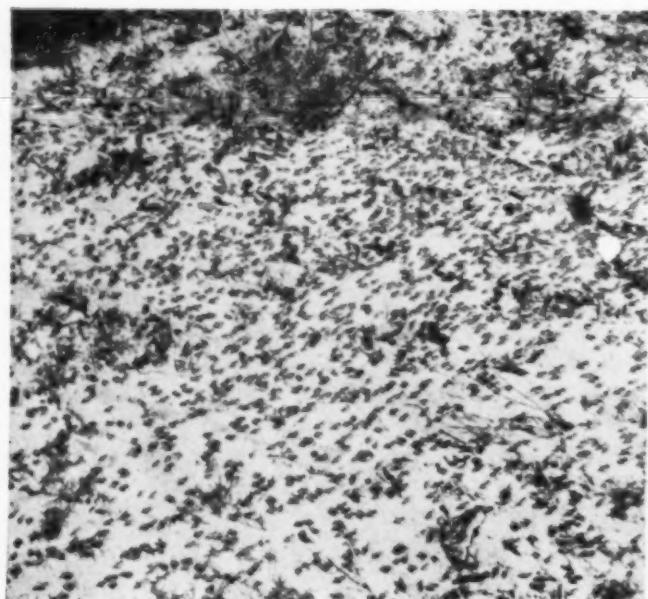
of *M. bivittatus* in north-central Montana is causing a grave control problem in that area.

At the present time, urgent bait demands from many States are necessitating the emergency purchase and rush shipment of large quantities of bait materials, and prospects are that the bait usage in 1948 will exceed that of 1947 or of other years since 1940.

The seriousness of the present grasshopper situation is emphasized by the fact that the expected increase in bait usage comes in addition to large sales of the new organic insecticides which are available in quantity this year for the first time. Chlordane and chlorinated camphene sprays and dusts have been widely used in grasshopper control this season and as a consequence much less bait has been spread than would have been had these insecticides not been available. Results with the new insecticides were generally very satisfactory in the early season when grasshoppers were nymphs and vegetation was green and tender. But field men report that with the appearance of adults and the maturing and drying of vegetation, the effectiveness of new insecticides is limited, and under these changing conditions farmers are daily increasing their demands for poisoned bait. ★★

Below: (left) U. S. Department of Agriculture photo showing long-winged grasshoppers traveling across country in heat of the day. Elaborate control methods are being set up to stop this pest which eats everything in its path.

(Right) After the grasshoppers have moved on. Without being controlled, the insects can destroy vast areas within a very short time, such as demonstrated by this once-prosperous cornfield in Texas. U.S.D.A. Entomologists fear a major invasion may be in offing for the U. S. this season. Latest chemical control methods are being used to reduce populations.



The Listening Post

Status of Insect Pests During May and June



This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Haeussler is in charge of Insect Pest Survey and Information, Agric. Research Adm., B. E. & P. Q., U.S.D.A. His observations are based on latest reports from collaborators in the department's country-wide pest surveys.

By G. J. Haeussler

BOLL weevils were reported during the first week of June as being less abundant in the cotton fields of South Carolina, Georgia, Mississippi and Louisiana than they were at that time last year. In many counties of Texas they are more numerous than a year ago. Hot, dry weather has helped hold the infestations down in many areas, but by the second week of June, reports of heavy infestations were received from Texas, Mississippi, and South Carolina.

The cotton fleahopper attracted much attention in southern Texas during the latter part of May and early June. Insecticides were being applied for its control in a number of counties.

The discovery last year of light, scattered infestations of the pink bollworm in extensive sections of north central Texas and in adjoining smaller areas in Oklahoma and New Mexico has resulted in extension of the Federal pink bollworm quarantine and control regulations to include this new territory, effective June 11. The area taken under regulation in Texas includes 43 counties north and east of the present Panhandle regulated zone. The following counties in Oklahoma were placed under regulation: Beckham, Caddo, Greer, Harmon, Jackson, Kiowa, Tillman, and Washita. This is the first time any part of Oklahoma has been included in the Federal quarantine. Roosevelt County was the only addition to the regulated area in New Mexico.

By the end of the second week

in June the beginning of the critical period for successful control of the European corn borer had been reached in many parts of the infested territory. Emergence of the moths was almost completed in New Jersey, Kentucky, southern Ohio, and southern and central Illinois. About 90 percent or more of the larvae had pupated in all areas except northern Illinois, northern Iowa, and in Wisconsin and Minnesota. Eggs had been found in some fields in numbers great enough to warrant insecticide applications in Kentucky, southern Ohio, central Illinois, and eastern Iowa. Growers in all areas where this insect is a problem can determine whether or not to treat their corn by making counts of the number of egg masses deposited per 100 plants and following recommendations as issued by their local agricultural agencies.

Emergence of codling moths progressed rather slowly during the last half of May and first two weeks of June in most areas due to cool weather. First emergence was reported from southern Michigan on May 15, from the Hudson Valley of New York on May 20, and from the Yakima Valley of Washington on May 21. By the end of the second week of June most of the moths from overwintered larvae had emerged in southern New Jersey, southern Indiana, and southern Illinois. A few larval entrances were reported the first week of June from southern Illinois and southern New Jersey.

Reports seemed to indicate that activity by the red-banded leaf

roller increased somewhat in some parts of New York state during the first half of June. The insect was present in alarming numbers in many orchards of northern Virginia and eastern Virginia toward the middle of June. A high percentage of injury to the light crop of apples in one orchard in that area was reported June 15.

Oriental fruit moth infestations were unusually severe in southern Indiana and southern Illinois during late May and early June. Larvae were reported injuring peach fruit in those areas and also in parts of New York and New Jersey.

European red mite infestations were checked in many orchard areas during late May and early June by unfavorable weather conditions. No reports of serious outbreaks of this or other orchard mites have been received thus far this season.

During the period from the middle of May to the middle of June, moderate to heavy infestations of the Mexican bean beetle were reported from parts of Virginia, North Carolina, South Carolina, Georgia, Tennessee, Florida, Alabama, and Mississippi. Infestations were lighter in other areas reporting, including New York, New Jersey, Maryland, Colorado, and Utah. Flea beetles caused serious injury to beans in eastern Tennessee late in May and the potato leafhopper was very numerous on beans in northwestern Tennessee toward the middle of June.

Cabbage caterpillars caused severe damage to cabbage and related crops during the first half of June in parts of South Carolina, Georgia, Florida, Louisiana, Tennessee, and in central Washington. Populations were generally light to moderate in other areas reporting. Early in June the cabbage seedpod weevil was very abundant on the rapeseed crop in the Lewiston, Idaho district, necessitating large-scale applications of insecticides.

Toward the middle of June the Colorado potato beetle had become abundant on potato, and in some instances on tomato, in New Jersey, South Carolina, and Tennessee. At the same time flea beetles were numerous on various vegetables in New Jer-



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sey and Tennessee; springtails were attacking vegetables, particularly cucumbers, squash, and melons, in unusual numbers in New Jersey and Minnesota; the onion thrips were seriously infesting onions in Florida and Tennessee; the tomato fruitworm was numerous in Georgia and Tennessee; a serious outbreak of the serpentine leaf miner occurred on cantaloup in the Salt River Valley of Arizona and leaf miners were also serious on eggplant in Florida and on sugar beets in Utah.

Infestations of the pea aphid were generally light on peas during the first half of June in New Jersey, Ohio, Illinois, Minnesota, Utah, Idaho, Oregon and Washington. Toward the middle of the month infestations were severe in most of the pea-growing districts of central and southern Wisconsin, necessitating large-scale insecticide applications. At

that time the insect was also multiplying rapidly in localities where conditions were favorable in the Blue Mountain district of Washington-Oregon.

Toward the middle of June pea weevil infestations ranged from light to moderate in Utah, moderate to heavy in central Washington. Dusting operations for the control of this pest started in southern Idaho early in June.

Infestations of the green peach aphid continued to increase on tobacco in Florida and Georgia. The insect was reported as being under control on cigar tobacco principally on shade-grown, in those states, but was causing serious damage to cigaret tobacco during early June. This aphid was reported as being widely distributed on tobacco in South Carolina, with infestations increasing rapidly. ★★

weather checked the potato blight infection reported in the Lower Rio Grande Valley early in March and up to harvest time in the latter half of April no further infection was found on either potato or tomato, nor had the disease been reported on either host from other parts of the state.

After an unfavorable period in Louisiana, rainy cloudy weather on April 12 and 13, followed by cool nights with heavy dews, gave ideal conditions for late blight, and the disease spread rapidly on potatoes in Terrebonne Parish. It reached epidemic proportions in some fields, although relatively little occurred in sprayed or dusted plantings. Harvesting was in progress during the first week of May. Some small infection centers were found on potatoes in Lafourche Parish. None has been found or reported on tomatoes in the state.

In Mississippi tomato late blight was found May 11 near Crystal Springs in one small well-isolated field planted with transplants obtained from Texas five or six weeks earlier. Cool nights and very heavy dews favored infection.

Potato late blight, apparently originating from diseased seed, was found in Alabama April 5, in Baldwin County, and was spreading rapidly by April 9. Copper dusts were the most widely used fungicides. A dithiocarbamate dust was being tried by a few growers. "Dithane D-14" was being used by those who preferred sprays. However, many growers were doing little or nothing to control the disease.

In South Carolina, a few lesions of potato late blight were found in one field on Johns Island in Charleston County, April 16. No more was found at that time in nearby fields. A survey made on April 22 on Edisto Island, on the same farms where blight was first seen in 1946 and 1947, revealed lesions quite generally distributed over the area and at least one small spot where the plants were almost completely dead. On the same day the disease was reported from a farm near Charleston. The location of all these infections

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Progress Reports on Plant Disease Control

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of **AGRICULTURAL CHEMICALS**. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Survey, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller



POTATO late blight became increasingly active during the latter part of April in the Florida Everglades section and was very destructive in untreated or carelessly treated fields. Digging was started at the beginning of May and yields were sharply curtailed where control programs were lax. Near Gainesville in north-central Florida, infection, apparently a week or so old, was observed on blossoming potato plants at the end of April, but dry weather in that section at that time was unfavorable to spread of the disease.

After a period of quiescence or absence on tomatoes in Florida generally, late blight resumed activity on this crop during the last part of April in the Homestead and the Everglades areas. In both cases reappearance was correlated with a period of cooler weather, and in the Everglades

with four successive rainy days as well. Near-epidemic attack occurred in some of the few remaining tomato fields in the Homestead section. It was thought that late blight had never previously been observed in that area so late in the season. In the Everglades the present infection on tomato plants was described as not the same in aspect as during the winter months, with no stem lesions observed, fewer leaf lesions per plant but more rapid killing of attacked leaflets, and less sporulation.

An interesting contrast in behavior of the disease in the Everglades during the winter and spring seasons is evident in the reports: in the fall crops the disease was serious on tomatoes but more easily controlled on potatoes, whereas in the spring crops the reverse is true.

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Comments . . .

By Dr. Alvin J. Cox

This column by Dr. Cox appears as a regular feature of AGRICULTURAL CHEMICALS. Dr. Cox formerly was successively Physical Chemist, Chief Chemist, Assistant Director, and Director of the Bureau of Science, Government of the Philippines. He was appointed Chief, Bureau of Chemistry, California State Dept. Agriculture in 1932, retiring in 1945.



THE Pacific Slope Branch of the American Association of Economic Entomologists met at Vancouver, B.C., June 14, 15 and 16 in the group's 32nd annual convention. Some 234 persons registered at the meeting, the first Pacific Slope Branch gathering ever to be held in Canada. All sessions were held at the Vancouver hotel, under the chairmanship of the branch officers: W. J. O'Neill, Wenatchee, Washington, chairman; J. N. Roney, Phoenix, Arizona, vice-chairman; and Roy E. Campbell, Alhambra, California, secretary-treasurer.

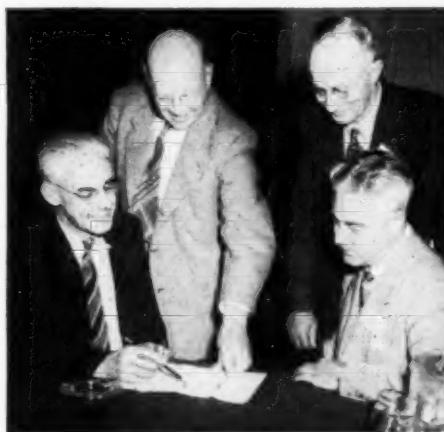
The meeting opened with an address of welcome by Professor H. J. Spencer, University of British Columbia, Vancouver. He pointed out the friendship existing between

entomologists of Canada and the U.S., and told how Canadian scientists draw upon American entomological

Floods Hamper Travel

Editor's note: In a letter accompanying his meeting report, Dr. Cox told about the travel difficulties experienced by many of the conventioners because of flood conditions in the Pacific Northwest. He writes that near Portland, Oregon, the passengers on the train had to disembark because of backwaters covering the tracks, and were obliged to continue their journey in buses to Kelso, Washington. Schedules were of course badly disrupted, and although many were delayed in arriving in Vancouver, but few missed hearing the presentation of papers.

literature and institutions, the U.S.-D.A., and other U. S. organizations for aid.



With the camera at the Pacific Slope Branch meeting at Vancouver, B.C.: Standing, left to right: M. P. Jones, U.S.D.A. Extension Service, Washington, D. C.; H. F. Olds, in charge of entomology inspections for Dominion, Vancouver, B.C.; L. M. Godfrey, sales manager for the Canadian Industries, Ltd., member of Canadian Committee

on local arrangements; and S. W. Clark, Texas Gulf Sulphur Co., Houston, Texas. Seated, left to right: James C. Barr, chairman, Canadian Committee on local arrangements; Ed Littooy, Colloidal Products Corporation; J. E. Buskert, Velsicol Corporation, Chicago; and James Marshall, Dominion entomologist, Summerland, B.C.

In response to the cordial welcome extended by Prof. Spencer, Mr. O'Neill replied that he regarded American organizations as being international in scope, and that scientific study should not halt at state borders.

S. A. Rohwer, president of the A.A.E.E. and assistant chief of the U.S. Department of Agriculture bureau of entomology and plant quarantine, Washington, responded by stating that fifty percent of present economic entomology programs deal with insecticides. He emphasized the need for more knowledge of insects, and stated that there is a new outlook for employment in the field of entomology. If economic insects are to be held in check, more emphasis must be put upon research, especially in the field of life histories, he declared.

In discussing the influence of developments in the field of entomology upon the Association, he stated that its 2,200 members are divided into three main groups of about equal size: U.S. Federal and Dominion workers; state workers; and industry representatives. He pointed out the need for numerous additional committees to act in behalf of the membership since the group has grown so large. The A.A.E.E. president stated that a governing body is needed in addition to the officers of the Association, and recommended a strengthening and modernizing of the group to broaden the aspects of entomology.

Ralph V. Newcomb, DiGiorgio Fruit Corp., Yuba City, Calif. presented a paper, "Use of Air-carrier

(Turn to Page 65)

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Technical Briefs

Orchard Pest Control

Two pounds of a 50 percent wettable DDT spray powder in 100 gallons of water, or a 5 percent dust gave satisfactory control of both the apple maggot and codling moth in four year's experiments in commercial orchards in New York State, it is reported by the N.Y. State experiment station, Geneva. Dr. R. W. Dean, of the station, reports that such control is possible providing "applications are made often enough to insure the presence of the insecticide on trees while the adult flies are active While DDT is toxic to flies, its effects do not persist for months on an apple tree as they do on the walls of a house or barn. It is less persistent than lead arsenate but kills apple maggot flies more quickly," he says.

DDT vs Crayfish

Farmers in Mississippi are using DDT for control of crayfish with satisfactory results, according to reports from the state of Mississippi which for years has been heavily infested with the crustaceans, which come out of their holes at night to mow down young corn, cotton and grass. From 5,000 to 10,000 crayfish "chimneys" per acre are not uncommon and up to 40,000 per acre have been counted. Some 40,000 square miles of the state's black soil belt were subject to their depredations. Previous control methods consisted of dropping turpentine or creosote into the holes, but this method was laborious and costly.

Study of Oil Sprays

Two series of narrow-boiling petroleum fractions were prepared by fractional distillation of two technical white oils of commercial origin. The oils selected represent distinctly paraffinic and naphthenic types whose viscosities fall within the spray oil range. The fractions were tested for their insecticidal efficiency using eggs

of the oriental fruit moth. Correlations of insecticidal efficiency with physical properties showed that conventional spray oils may contain a high proportion of hydrocarbons which are inactive insecticidally. The data indicate that an ideal fraction would boil at 10° plus or minus 5°F. at 1 mm. of mercury and would have a Saybolt viscosity at 100°F. of 70-80 seconds. The ideal properties set up should be useful as a guide in developing improved products or for inspection of present products. G. W. Pearce, P. J. Chapman, and D. E. H. Frear, *Ind. Eng. Chem.* 40, 284-93 (1948).

Means to Protect Grain

Seeds and grain are protected against insect pests by distributing a finely crystalline and freely flowing gamma-alumina of low bulk density throughout the mass of grain. The amount of alumina should be 0.1 per cent. H. V. A. Briscoe, J. A. Kitche-
ner, and P. Alexander. British Patent N. 572,311.

Grasshopper Control

Control of the grasshopper, *Cannula pellucida*, with an aqueous emulsion containing 2 per cent of 4,6-dinitro-ortho-cresol sprayed from an airplane was used, to give an average deposit of 1.1 pound of the insecticide per acre. The average reduction of the grasshopper population was 75 per cent. Crested wheat grass was not damaged by the insecticide; wheat in an area adjoining the treated fields was visibly injured but recovered. Stinkweed, lambs quarters, caragana, and boxelder were severely

injured. A. W. A. Brown, *J. Econ. Entomol.* 40, 606.

Brush Control With 2,4-D

Comments on the use of 2,4-D for brush control are contained in a preliminary report by Harry M. Elwell published in *Oklahoma Crops and Soils*, Experiment Station Bulletin #B-319. Spray solutions were prepared by mixing 2,000 ppm of 2,4-D with water. The highest percentage of plants affected occurred on brush ranging from four to seven feet high. The 2,4-D spray did not seem to be effective on the larger trees.

From this preliminary study it appears that some species of trees and brush are susceptible to 2,4-D and others are not. Even the second application has little or no effect on many species. Therefore an attempt was made to classify the plants tested in order of their susceptibility. However, this arrangement represents tests made only in 1946 and the percentage of susceptibility may change as more information is obtained regarding the proper stages of growth, weather conditions, etc., necessary for maximum results.

In general, the 2,4-D's appear to cause a gradual dying of the trees and brush. The leaves turn brown and often the twigs curl and twist in two to three weeks. The plants most readily affected soon developed an abnormal knotty growth of the cambium layer along the main stems. This condition often caused cracking, splitting and deterioration of the wood.

These sprays were not toxic to native grasses but they did kill broad-leaved plants such as cotton and legumes.

Potato Top Killers Show Promise

FOR generations, potato growers have been faced with numerous problems, particularly from the standpoint of controlling insect pests, diseases and weeds. Within recent years it has been learned that potato leaf roll could be prevented from infect-

ing the tubers of seed potatoes if the vines were killed as soon as the disease appeared in the field. This brought a need for an effective and rapid potato vine killer for use on seed potatoes. Then with the advent of the use of DDT and the prolonged

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Just dust on 75 to 125 lb. of AERO Cyanamid, Special Grade per acre ten days before harvest time. Within a few days, tops will die, and at the end of the ten-day period the crop will be ready for harvesting.

ON TOMATOES . . .

An application of 25 to 30 lb. of AERO Cyanamid, Special Grade per acre in late summer will cause the leaves to dry up and fall off in 5 to 10 days. This exposes the remaining unripened fruit to sunshine so that it can attain a rich, full color before damaging cold weather sets in.

ON COTTON . . .

AERO Cyanamid, Special Grade is usually applied at the rate of 30 to 35 lb. per acre any time after the last bolls which will make cotton are 30 days old. Leaves then start to drop off within 2 to 4 days, and the result is a clean crop that is easily picked by hand or by machine.

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growing period in the Northern potato growing areas it became necessary to kill the vines so that the tubers would ripen in time to be dug and stored before freezing weather arrived.

About this time the early potato growers in the south found that they could produce a better quality potato if the vines were killed several days before the harvest to allow the potato skins to set and prevent scuffing in the harvesting operations. In addition, potato growers have found that killing the vines, weeds and grass that may occur in potato fields, enables the mechanical diggers to operate more efficiently and the pickers to gather the potatoes more quickly and with less loss.

At first the potato seed producer pulled the vines to prevent the tubers from becoming infected with leaf roll. This is a virus disease that is transmitted from plant to plant by aphids and which gradually spreads through the plants to the tubers where it will be carried over and cause severe injury to the next years crop.

However, hand pulling is too slow and laborious for large-scale usage and vigorous demand has resulted in the search for a safe and fast-acting means of killing the weeds and potato vines. Great strides have been made toward the solution of this problem. The search has lead to the production of chemical materials that will kill the weeds and potato vines

without injury to the tubers. These preparations enable growers to harvest their crops at any time without having to contend with heavy vine growth or weeds that may clog up the diggers, cover the tubers and make harvesting slow and difficult.

Experiments have been conducted in the potato growing regions of Florida, Pennsylvania, Long Island, upstate New York and Maine during the past two seasons with "Penite 6," a non-selective sodium arsenite weed killer (containing approximately 54% As_2O_3). It is manufactured by the Pennsylvania Salt Manufacturing Company of Philadelphia and Tacoma, Washington. The results of these tests show promise of the complete solution of the problem of how to kill weeds and vines in the potato fields prior to harvesting the crop.

Applied to plots at various concentrations "Penite 6" was studied from the standpoint of various means of application, the results that may be obtained from applying at different times of day, at different locations and at different temperatures. Tests conducted at Presque Isle, Maine with a number of vine killers indicated that

Chemical vine killer being applied from tractor-boom outfit in Maine. Photo at right shows potato field (L) which has received top-killer contrasted with adjacent check plot. (Photos courtesy Pennsylvania Salt Mfg. Co.)

the results may vary greatly, with the temperature and/or time of day that a given chemical is applied. For example, the effects of the application of one chemical at 3 P.M. were much more rapid than when the chemical was applied at 6 P.M. Similarly, it was found on Long Island that the kills were much more rapid when the chemicals were applied on a warm sunny summer day than when they were applied on a cool cloudy autumn day. However, the final results were satisfactory in either case. Coverage of the plants was found to be of extreme importance and under conditions of dense vine or weed growth it was sometimes necessary to spray twice at about a three to five day interval to secure complete kill.

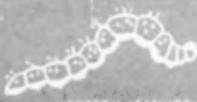
Single applications of "Penite 6" at two to four quarts per 100 gallons of water, used at the rate of 80 gallons per acre and applied with traction sprayers equipped with 2 nozzles per row using 350 pounds pressure gave very satisfactory kill of potato vines in Maine. Other large power-take-off driven sprayers using three nozzles per row at 500 pounds pressure were also satisfactory in Maine and New York. The four quart dosage seemed to give slightly faster and more effective kill (especially of grass) than the two quart dosage.

Numerous analyses of treated potatoes have indicated that there is no absorption whatever of arsenic from sprays of this type. ★★





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Suppliers' Bulletins

Larvacide Bulletin

Southern Entomological Co., W. Palm Beach, Fla., has published further literature on control of mosquito larvae with "Tossit," a capsulated larvacide containing concentrated DDT. These are in addition to previous announcements by the company for similar products for control of land crabs. One "Tossit" capsule is said to kill mosquito larvae on 750 square feet of water. No application machinery is necessary. Bulletins available from company, P.O. Box 3191, W. Palm Beach, Florida.

Mixing-Blending Bulletin

Robinson Mfg. Co., Muncy, Pa. has issued a bulletin on its complete line of insecticide processing equipment. Described are a variety of sifting units, combination mixing and sifting insecticide blenders, cutters, and grinders. The bulletin states that the equipment is designed to meet the requirement of both large and small manufacturers of insecticides of both the dust and liquid spray type. Write for bulletin No. 75, care of the company, Muncy, Pa.

Offers New Lab. Stirrer

Baker Instrument Co., Orange, N. J. offers a new high-powered stirring device for use in laboratories. The instrument provides two shafts to give operators optional speeds up to 900 rpm on one, and to 19,000 rpm on the other. Power is from a 1/15 hp motor. Information is available from the company, 17 S. Day St.

Plant Layout Brochure

Schutte and Koerting Co., Philadelphia, has released a four-color diagrammatic layout of a high pressure power plant to illustrate the application of a number of types of power plant equipment. Eight color combinations are used in the booklet

to differentiate between steam, exhaust steam, condensate, water, raw water, fuel oil, lubrication oil and air. Copies of the layout are available from the company, 12th & Thompson streets, Philadelphia 22, Pa.

Offers Garden Sprayer

Dobbins Manufacturing Co., Elkhart, Indiana, has placed on the market a lightweight garden sprayer



with 2 gallon capacity. The sprayer is equipped with an automatic trigger-quick spray lock, three foot hose and 12 inch extension rod. The double-purpose tank handle also serves as a compression pump. Literature is available from the company.

New USDA Booklet

The U. S. Department of Agriculture has issued a new control program for internal parasites of livestock, in its booklet "Save Grain by Controlling Internal Parasites." The booklet points out the annual loss of \$125 million caused by such parasites and advises livestock raisers about the proper control material to use, the correct formula, and when is the most effective time to use it. Statistics are presented on the amounts of extra grain required as food for animals

infested with parasites. Copies of the booklet are available from the U.S.D.A. office of information, Washington 25, D. C.

Dow Weed Booklet Out

Dow Chemical Co., Midland, Mich., has published a revised edition of its "Weed Killer Guide for Dow Salesmen," and has a limited quantity for general distribution. The booklet gives condensed information on plant terminology, classification of chemical weed killers, correct dosages, proper equipment, and presents the advantages of selective spraying of weeds, and information on new herbicides under experimentation. Also included is the report of the policy committee on herbicides of the North Central Weed Control Conference.

Pyrethrum Publication

A new Quarterly publication, Pyrethrum Post, is scheduled to appear late this month in England. The paper is published by Messrs. Mitchell Cotts & Co., Ltd., London for worldwide circulation among growers, suppliers, processors, users and others interested in pyrethrum. The London firm is an affiliate of Greene Trading Co., Inc., New York importers of pyrethrum.

Emulsifier Booklet Out

Atlas Powder Co., Wilmington, Del., has issued a booklet, "Surface Active Agents in Insecticides," in which tables are presented with various insecticides and different wetting agents. It explains fully the function of emulsifiers, spreaders, or wetting agents in general, and describes specifically the Atlas products, "Span," "Tween," "NNO" and "Atlox."

In addition to insecticides, there is information on the use of emulsifiers with the methyl, butyl and isopropyl esters of 2,4-D, pointing out the importance of emulsifiers in penetrating leaf surfaces. Copies of the booklet are available from Atlas Powder Co., Wilmington 99, Delaware.

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Experiment Station Digest

By H. H. Lawson

ENTOMOLOGISTS at the New York State Agricultural Experiment Station, Geneva, N.Y., conducted some 70 different research projects involving use of insecticides during the period covered by the station's 66th annual report for 1947. In the field of plant pathology some 30 other projects dealing with fungicides were also reported.

Among outstanding results briefly summarized, it was reported that the "Zerlates" (two types) and "Fermate," used on fruit and other food plants, exerted a repellent effect on the Japanese beetle. Sulfur also showed some repellent effect but not enough to protect the crops properly. Addition of DDT to any of the fungicides controlled the beetles very well and DDT alone was also effective. Using DDT at certain periods and depending on the fungicides during other portions of the growing season makes it possible to avoid excessive DDT spray residue, it was pointed out. "Ryanex" was also effective in controlling the beetle, while benzene hexachloride showed very good control on plums.

For control of Japanese beetles on grapes, aluminum sulfate and lime was a very good beetle repellent, but addition of DDT to the mixture made it even more effective. Two applications of DDT-bordeaux spray reduced loss of grape foliage and gave good commercial control.

A sudden increase of the red-banded leaf roller on apples in western New York raised the question as to whether this outbreak might be due to destruction of parasites and predators through use of DDT sprays. Results of an investigation, so far obtained, says the report, indicated that factors other than DDT may be responsible for the sudden increase of this species.

DDT was tested for control of cherry fruit flies, but, although effective in cage tests, the control in

cherry orchards was "very disappointing," the Geneva investigators report. Limited tests with benzene hexachloride gave practically no control, even with three applications, and the fruit, furthermore, retained at harvest the objectionable musty odor of the chemical which rendered the cherries unmarketable. Both compounds were tested as substitutes for rotenone which has been recommended when the cherries are intended for the fresh fruit market.

Fourteen spray experiments and nine dust tests were made in an investigation of controls for gooseberry fruit worms on currants. DDT materials and their analogs showed great promise for control of the insects, but, pending settlement of the residue problem, are not at present recommended by the Geneva station authorities.

Among the dusts DDT, rotenone extract and benzene hexachloride were combined with various copper fungicides. Rotenone compounds gave the highest kill; BHC gave no control; and DDT was intermediate. Summed up, the report states that results with dusts were much inferior to those secured with sprays, possibly due in part to a duster which gave inferior coverage. "Until an efficient duster has been developed," remarks the report, "this method of application cannot be generally recommended."

Extensive field tests of insecticides for control of European corn borer, the Geneva scientists declare, demonstrated that two potent poisons, viz., "Rynia" and DDT, are available against the insect. No appreciable foliage injury followed use of dust containing either of these materials, although in previous years DDT dusts occasionally caused some injury. Conditions under which injury may occur are being investigated.

Claims made by manufacturers of twine used in hop fields that downy mildew of rapidly growing

hop vines could be controlled if the twine was treated with fungicides, led to an investigation of their validity.

Twine carrying five different treatments was compared with non-treated twine and the report states that "While a slight reduction in disease was noted, neither infection data nor final yield revealed any of the treatments to have significant or consistent value. For this reason and in view of the increased cost of treated twine, this approach toward disease control has been discontinued as impractical. The spraying of poles with bordeaux will be recommended, since this operation can be made with very little cost in time or materials."

A number of different fungicides and combinations of "Fermate" or "Zerlate" with various copper fungicides were tested at the Geneva station to determine which fungicide or combination of fungicides would give the most effective control with the least amount of plant injury, of the following four tomato diseases in western New York: early blight, anthracnose, late blight and leaf mold. No single fungicide adequately tested gave maximum control on all four diseases, and the report continues:

"Best control of the four diseases was obtained with alternate schedules of 'Fermate' or 'Zerlate' and various copper fungicides. A 'Zerlate'-bordeaux schedule in the following order of applications was outstanding — 'Zerlate' - 'Zerlate' - bordeaux, using an 8-4-100 bordeaux and 'Zerlate' at two pounds to 100 gallons. No apparent injury resulted from this schedule.

Arkansas Report

ARKANSAS Experiment Station at Fayetteville, reports that experiments with benzene hexachloride for control of aphids on spinach have shown this compound to be effective. "It kills by fuming action, like nicotine," says the report, "but unlike nicotine, it is useful at relatively low temperatures. Further experiments will be necessary before definite recommendations can be made, but the

(Turn to Page 66)

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INDUSTRY NEWS

Allen Succeeds Cavanagh in Dow Agri. Division



William W. Allen

Joseph A. Cavanagh, in charge of agricultural chemical sales for Dow Chemical Co., has retired from active duty after 39 years of service with Dow. Mr. Cavanagh's successor is William W. Allen.

Since joining Dow in 1909, Mr. Cavanagh has been closely associated with the agricultural chemical field, having begun his Dow career in the Insecticide Division as production superintendent. In the early 1920's he was made assistant sales manager in charge of insecticides and agricultural chemicals; the post which he maintained until his retirement.

Mr. Cavanagh played a prominent part in developing the company's technical research and de-



Joseph A. Cavanagh

velopment program in this field. Under his guidance, the agricultural chemicals division grew from a staff of three persons handling ten products, to the present staff of 41 in a department producing over 50 products.

Mr. Allen, the new manager, joined Dow in 1931 as a chemist in the organic laboratory. He later transferred to the insecticide sales staff. Subsequent advancements made him a member of the company's technical research staff, then a member of the technical service and development division staff in the sales department, and later manager of the division. He is a graduate of the University of Minnesota.

AIF 15th Year Meeting

The Agricultural Insecticide and Fungicide Association will hold its annual meeting at the Essex and Sussex Hotel, Spring Lake, N. J., September 7, 8 and 9. Lea S. Hitchner, executive secretary of the Association has announced. The event will mark the 15th anniversary of the founding of the A.I.F. Association.

Committee meetings and the conducting of Association business

will occupy the first day's session, with open meetings being held during the following two days. State and Federal workers and other interested persons are invited to attend. A highlight of the meeting is expected to be the 15th anniversary dinner on September 8th, with past presidents of the Association as guests.

Speakers who at press time had consented to appear on the program included Eugene Butler, editor

of the *Progressive Farmer*, Dallas, Texas; S. A. Rohwer, assistant chief of the Bureau of Entomology and Plant Quarantine, U.S.D.A.; and Claude Welch of the National Cotton Council. Dr. A. B. Heagy, Maryland State Chemist and Dr. E. L. Griffin, assistant chief of the Insecticide Division, Production and Marketing Administration, U.S.D.A., will participate in a forum on labeling. Tentative plans called for an address by Dr. Stanley B. Freeborn, assistant dean of the California College of Agriculture.

Merger is Announced

The merger of Food Machinery Corporation and Westvaco Corporation has been announced jointly by Paul L. Davies, president of Food Machinery Corp., and William B. Thom, president of Westvaco Chemical Corp. The former, as the surviving company, will change its name to Food Machinery & Chemical Corporation. The business of Westvaco will be operated under the direction of its present management as the Westvaco Chemical Division of the company, and Westvaco's interests will be represented on the board of directors.

Although the merger agreement has been reached by the boards of directors and managements of the two companies, approval is also required by both preferred and common stockholders of the two companies. A merger agreement accompanied by a proxy statement was being prepared to be sent to stockholders early in July. The agreement will provide for an exchange of 114 shares of Food Machinery's common stock for each share of Westvaco's common stock and for the exchange on a share-for-share basis of Westvaco's \$3.75 cumulative preferred stock of Food Machinery and Chemical Corporation having the same dividend rate and substantially the same rights and preferences attaching to the present Westvaco stock.

Is DDT Really Scarce?

—Industry Answers both "Yes" and "No"

HAS DDT become really scarce? That was the question being batted around in the insecticide industry as this issue was about to go to press. With the exception of two producers, DDT manufacturers had recently advanced their prices five cents on technical to 34c per pound. The others remained at 29c. However, when surplus stocks of DDT were very heavy two and three months ago, this latter price was being shaded considerably and some tonnage sales of technical were made as low as 25c lb. Actually, irrespective of producers' list prices, and whereas 29c was formerly a "list" price from which sales prices were cut, today this is reported to be below the market.

Although there are those in the insecticide industry who term the DDT price rise as "phony," there is more than a faint suspicion that their stock position may not be exactly ample for their needs and that they were caught without stocks by the rise. They maintain that in spite of the fact that spot DDT is not as readily available as it was, there is no indication that old orders are not being filled or that the material cannot be bought. They stated that they could buy all the DDT they wanted at 34c or less.

That the heavy surplus stocks of early spring have been cut down is well known. One large producer who was reputed to have had some four million pounds on hand is now said to be oversold and because he cannot resume production economically at this season, is buying on the open market. A considerable part of this tonnage is reported to have gone for export. Two other makers have not been taking under thirty days delivery for the past 60 days. One producer is known to have been buying back DDT technical from his customers at a slight premium. Another is reported to have bought up several lots of 50 per cent wettable

powder on the open market to help take care of his commitments.

Those producers of technical DDT who have advanced their prices term the supply situation tight, and regard the price rise as entirely logical and in order. One spokesman for a DDT supplier said that his company was not taking orders for DDT, that it was committed as far ahead as it wished to be and that the situation in general would become tighter before it loosened up. Another observer stated that the whole thing depended upon who goes back into production and when, that most plants ceased production in January when price conditions were unfavorable and when surplus stocks had become very large, and they naturally were reluctant to resume operations in the middle of the summer months for only a short period. It is therefore likely, according to this observer, that if DDT were tight early in July, and if no further manufacturing facilities were put into operation, the spot supply by August and September would be reduced sharply.

Still others in the DDT arena were undecided which way the trend is running. All agreed that there was a strong possibility of a DDT shortage, but some were not sure that this condition had arrived as yet.

2,4-D Air Dust Forbidden

The dusting of 2,4-D from airplanes is no longer permitted under rules laid down on June 23 by the Civil Aeronautics Authority and the U.S. Department of Agriculture. This action, resulting from complaints of cotton growers that their crops had been damaged by drifting dust particles, does not prohibit the spraying of 2,4-D. Neither does the new prohibition affect the airplane application of insecticides or fungicides in either spray or dust form.

Hereafter, when waivers are issued to operators using aircraft for dusting or spraying, a special provis-

ion will be included which forbids the use of 2,4-D in dust form.

In Arkansas, drastic action was reported to have taken place in the seizure of all weed killer materials in both spray and dust form, in a number of localities in the state. The

The State of Louisiana on July 1, issued regulations covering use and sale of 2,4-D. Prohibited are "the importation, storage, sale and use of 2,4-D or any of its derivatives in dust form;" "The importation, storage, sale and use of esters of 2,4-D . . . except under special permit;" "The use of air jet, air blast or turbine blower spray equipment for applying 2,4-D."

Permissible forms of 2,4-D in the State include the sodium, ammonium and amine salts of 2,4-D in aqueous solution, in emulsion form, or as solids to be dissolved in water. These "may be sold and used for purposes of weed control." Special permits will be granted for brush control in isolated areas.

seizures were made under authority of the states Act 171 of 1947, because the labels on the containers allegedly did not carry sufficient warning against the danger of killing other plants, according to Paul M. Millar, chief inspector. He reports that the seized materials included 106 containers of 1 gallon or less; 20 five gallon cans, 8 one hundred pound drums; 10 fifty pound bags and 21 barrels. These were in the hands of local dealers and distributors. Mr. Millar states that "There was considerable cotton similarly injured by weed killers last year in dusting and spraying rice fields in Arkansas, Texas and Louisiana, with several law suits now pending, and the action of the Board is an attempt to prevent recurrence of this trouble, in so far as it can be done by requiring ample warnings to be given on the labels of the containers of weed killers."

To Examine New Organics

The Agricultural Insecticide and Fungicide Association, New York, has announced the formation of an over-all committee to coordinate all available scientific data on the new organic pesticides. L. S. Hitchner, executive secretary of the Association, terms the move as a "long-range program of study" which is to be accomplished with the cooperation

of a number of public and private agencies.

Although the complete committee had not yet been named at press time, a number of organizations had already accepted the Association's invitation to be represented. S. A. Rohwer, assistant chief of the U.S.D.A. Bureau of Entomology and Plant Quarantine, will serve as advisor. He is also chairman of the

Editor's note: Readers of Agricultural Chemicals who are interested in helping to compile factual information on the organic pesticides are invited to send scientific reports and observations to Dr. Charles L. Smith, A.I.F. Association, 285 Madison Ave., New York 17, N.Y. The completed report will be available to all cooperating persons and groups as well as public information outlets.

Federal Interdepartmental Committee on pest control.

Others who have accepted the invitation to serve include Dave Thompson of New York City, agricultural consultant for the Grocery Manufacturers of America; Major W. S. Everts of San Francisco, vice president of the Canner's League of California; H. K. Thatcher of Washington, D.C., secretary of the National Association of Commissioners, Secretaries and directors of Agriculture, Edward L. Holmes of Chicago, director of the Department of Sanitation, American Institute of Baking and Charles H. Mahoney of Washington, D.C. director of the Raw Products Bureau, National Canners Association.

Forms New Chemical Co.

Phillips Petroleum Co. has formed a wholly-owned subsidiary company to be known as Phillips Chemical Co. Frank Phillips is chairman; K. S. Adams, president; Ross W. Thomas, executive vice-president; Paul Endacott, Don Emery, G. G. Oberfell and R. C. Jopling, vice-presidents. G. W. McCullough is vice-president and general manager.

The company has leased the Cactus Ordnance Works at Etter, Texas, to produce ammonia nitrogenous fertilizers, and expects to build an additional plant to make ammonium nitrate.

Zacharias Named by So. States to Succeed Wysor

Southern States Co-operative, Inc., Richmond, Va., has named O. E. Zacharias, Jr. as general manager of the establishment to succeed W. G. Wysor, founder of the co-op and

board of directors of Cooperative Mills, Inc.; Cooperative Seed & Farm Supply Service, Inc.; and Cooperative Fertilizer Service, Inc., subsidiaries of Southern States.



MR. ZACHARIAS



MR. WYSOR

manager for the past 25 years. Mr. Wysor will act as management counsel after retirement from active duty.

The new general manager joined Southern States in 1935 after a distinguished business career in Virginia. In addition to his position with Southern States, he has for the past ten years been a director of United Cooperatives, Inc., Alliance, Ohio. He has also served as a member of the

Mr. Wysor has carried the management responsibility of the co-op since its establishment.

Alabama Firm Expands

Agricultural Sulphur and Chemical Co., Dothan Alabama, has recently expanded its operations to include dust mixing facilities at Montgomery, Alabama, it has announced. The firm has also reported the recent appointment of George R. Williamson as general manager in charge of the company's sales and production. He was formerly with Capital Drug Co., Montgomery.

Rotenone Price "Break"?

Rotenone prices appeared to be heading downward as this issue went to press. Although some industry spokesmen were reluctant to call the trend a "break," one source stated that the price has broken. "Let's not kid ourselves about that," he said.

Factors entering into the downward trend included heavy production of cube at the source, a considerable carry over of stocks from 1947 which was a poor year for insecticide sales, and less demand during the spring months than had been anticipated. The pressure of rather heavy unsold stocks had caused the price to break from its former 38c level to below 35c; with one supplier stating that he had quoted 32c in carload lots.

Another spokesman described the lower quotations as being "spotty," and said that as soon as rotenone stocks were reduced, prices could be expected to firm up again.

Meetings

Eighth International Congress of Entomology, August 9-15, Stockholm, Sweden.

Connecticut Agri. Field Day, August 18, Mt. Carmel, Conn.

15th Annual A.I.F. Association Fall Meeting, September 7, 8 and 9, Essex & Sussex Hotel, Spring Lake, N.J.

All-Iowa Soil Conservation Field Day, September 9, Oskaloosa, Iowa.

Economic Poisons Control Officials, Second Annual Convention, October 9, Shoreham Hotel, Washington, D.C.

California Fertilizer Association 25th Annual Convention, October 18 & 19, Mission Inn, Riverside, Calif.

North Central Weed Control Conference December 7, 8 and 9, Abraham Lincoln Hotel, Springfield, Illinois.

Amer. Ass'n. Economic Entomologists, New Yorker Hotel, New York, December 13-16, 1948.

You'll Need Plenty of this *FALL*, too!



Month after month the demand for Ded-Weed has increased by leaps and bounds as more and more farmers, sprayers and dealers found its outstanding quality and versatility ideally suited to their needs. All indications point to a tremendous demand this Fall—a demand that can mean extra profits for you. However, supplies are limited and the only way to be sure of having the Ded-Weed you will need is to place your order now for Fall delivery. Don't wait until it is too late. Send in your Fall Ded-Weed order *now!*

KEEP A GOOD STOCK OF THESE THOMPSON-HAYWARD INSECTICIDES ON HAND

DED-TOX (DDT)

PHENACIDE (Toxaphene)

TRI-6* (BHC)

TOXICHLOR (Chlordane)

All of these potent, laboratory-tested insecticides are available as water emulsifiable and oil soluble liquid concentrates; wettable powders, dust base concentrates and low strength dusts.

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OMAHA

CORPUS CHRISTI
DALLAS
TULSA
HOUSTON
DENVER

AGRICULTURAL CHEMICALS

Noble to Penick Board

Harold Noble has been elected to the board of directors of S. B. Penick & Co., according to an announce-



Harold Noble

ment made by S. B. Penick, Jr. president of the company. Mr. Noble has been associated with the firm for more than 30 years. He is vice-president in charge of the Insecticide Division, and is well known throughout the industry. His election to the Board was to fill a vacancy created by the recent death of Charles W. Speed.

Perkins to U. S. Staff

George W. Perkins, executive vice-president of Merck & Co., Inc., Rahway, N. J., has been named by the Economic Cooperation Administration to the Paris staff of W. Averell Harriman, U.S. Special Representative in Europe.

Hyman-Velsicol Decree

According to the terms of a decree handed down in the Superior Court of Cook County (Chicago), Julius Hyman, defendant in a patent suit brought by Velsicol Corporation, must "assign and transfer to . . . Velsicol Corporation," application for four patents, for United States rights, and for corresponding applications filed in foreign countries.

Dr. Hyman was also restrained by the court from using the patents, or from disclosing secret processes and formulas to anyone other than Velsicol Corporation.

Velsicol Corporation with the same decree was ordered to pay to Dr. Hyman "money actually and necessarily disbursed . . . for filing fees and for legal fees relating directly to the filing of . . . applications."

Cotton Meeting in Oct.

The second annual beltwide cotton mechanization conference is scheduled to be held at Lubbock,

Texas October 14, 15 and 16. The event is sponsored by the National Cotton Council of America in cooperation with the Farm Equipment Institute, the U.S. Department of Agriculture, Land Grant Colleges, and various farm organizations. Early announcements of the event stated that some 400 persons were expected to attend. Last year's conference was held at Stoneville, Mississippi with a heavy registration.

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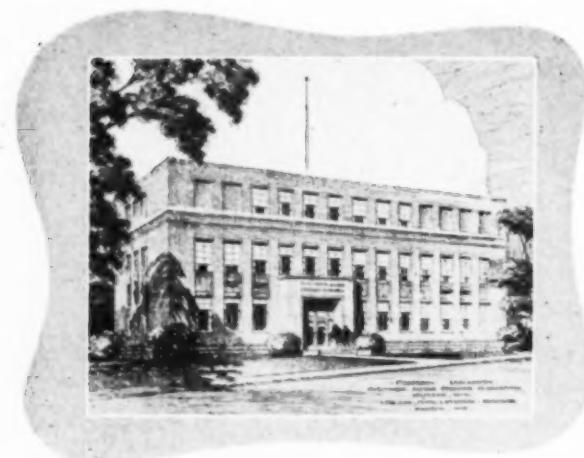
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RANGE COVERED

Oils with a viscosity of 120 Saybolt or less cover the great majority of oils used in Dormant and Summer Sprays.

GENERAL TEXTURE

Mul-si-mo is a thin amber-colored oily liquid about the same viscosity as Kerosene Oil.

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There is nothing complicated about the use of Mul-si-mo. It is just poured into the oil to be treated at the rate of $\frac{1}{2}$ to 1%, depending upon the tightness of emulsion desired—then thoroughly stirred—and the process is completed.

RESULT OF MIXING AS ABOVE

A practically 100% Oil Product—No Water—No Soap—No Potash nor other Alkalines.

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Mul-si-mo is Neutral. Mul-si-mo-Made Emulsions are not adversely affected by pronounced

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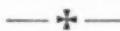
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PYROPHYLITE



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Absolutely Non-Abrasive and Adheres Readily
to Foliage and all Surfaces.

PHYLLITE'S UNIFORMITY IS UNSURPASSED

A chemical analysis run consistent in every batch of PHYLLITE assures the insecticide manufacturer of absolute uniformity for use as a diluent and carrier. PHYLLITE is ground in a Raymond Mill—95% through 325 mesh. Has a low pH (5.1).

IMMEDIATELY AVAILABLE

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- Packed in 50 lb. valve bags.

20 ton lots. \$15.00 per ton. F. O. B. plant.

- Smaller quantities if desired



PIONEER PYROPHYLITE PRODUCERS

HANCOCK 2-2992

P. O. BOX 686

CHULA VISTA, CALIF.

S-W Co. Names Bewick

Sherwin-Williams Co., Cleveland, has announced the appointment of Lawrence F. Bewick as technical field representative, to work with farmers, fruit growers and cattlemen



L. F. BEWICK

and distribute information on the use of insecticides, fungicides and herbicides. He will conduct cooperative field tests with county agents, weed supervisors and experiment stations in the midwest, including the states of Missouri, Iowa, Kansas, Oklahoma, and Nebraska.

Dr. William Funkhouser

Dr. William D. Funkhouser, entomologist, and dean of the Graduate School of the University of Kentucky, died June 9 at Lexington Ky. He was 67 years of age. He had been professor of zoology and head of the zoology department since 1918, and in 1927 was made professor of anthropology. Dr. Funkhouser helped direct rescue efforts when Floyd Collins was entombed in Carter Cave in Kentucky nearly 20 years ago.

New Fertilizer Plant

Installation of superphosphate production equipment at the new Winchester, Ky., plant of Southern States Fertilizer Service was expected to be completed by July 1, it was announced last month by the cooperative's management from their Richmond, Va., headquarters. On April 28 the Winchester plant loaded

its first carload of mixed fertilizer, barely three months after the first shipment of steel for the building arrived on the construction site. When fully equipped the plant will have a capacity for 12,000 to 15,000 tons of mixed fertilizer and 10,000 tons of superphosphate per year, depending on the availability of raw materials. The location at Winchester is expected to save Kentucky members of the co-op many dollars in transportation costs.

Geuther to Hudson Co.

H. D. Hudson Manufacturing Co., Chicago, has announced the appointment of R. O. Geuther as manager of the company's advertising department. Mr. Geuther was formerly vice-president and director of copy at Evans Associates Co., Chicago advertising agency, and has for the past four years prepared Hudson publication advertising and assisted in other matters pertaining to advertising and sales promotion.



A direct step toward better flowability and dustability for your product is taken when you make DILUEX a constituent. Adsorptive properties make it a superior carrier of toxicants. It prevents caking or agglomeration of impregnated materials. As a grinding aid, bulk conditioner, and abrasion reducer, DILUEX is unexcelled. Its low density enables the manufacturer to control package volume as may be necessary. Investigate this adaptable diluent.



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Dr. W. G. Reed III

Dr. W. G. Reed, chief insecticide division of the U.S.D.A. Production and Marketing Administration was reported to be resting well



DR. W. G. REED

at press time following an attack of coronary thrombosis suffered on June 15. Dr. Reed was returning to Washington from the meeting of the National Association of Insecticide and Disinfectant Manufacturers at Spring

Lake, N. J., when he was smitten. Joseph A. Noone, Pennsylvania Salt Manufacturing Co., Philadelphia, was driving the car in which Dr. Reed was riding, and he rushed the patient to Jefferson hospital in Philadelphia. Dr. Reed was expected to remain there until about July 7, after which time he was to be transferred to his home to recuperate.

Lime Imported Free

Provision for the free importation of limestone to be used for fertilizer has been made through the signing by the president of House bill 5275 on June 24. This bill amends paragraph 1685 of the tariff act of 1930, so that it now includes on the free list "limestone, crude, crushed or broken, when imported to be used in the manufacture of fertilizer."

Stanton Advanced by U.S.I.

George H. Stanton has been appointed as Chicago division manager of U.S. Industrial Chemicals, Inc., it was announced July 1 by Lee

A. Keane, vice president in charge of sales. Mr. Stanton succeeds Joseph F. Rudolph who was recently named president of Dodge & Olcott, Inc.



GEORGE H. STANTON

wholly owned subsidiary of U. S. I.

Mr. Stanton has been an employee of the company since 1932, following his graduation from Syracuse University that year. He has served as assistant division manager in Chicago since 1943.

What's Your Problem?

Aphid Spray

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Nicotine Base for Dust

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Controlling Poultry Roundworm (Ascaridia galli)

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Delousing Poultry

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Dip and Drench for Sheep, Goats

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Control of Certain Cattle Lice

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1. The FAMOUS BLACK LEAF 40—for spraying or dusting to control small sucking insects, plant lice, and similar pests. Also used to control external parasites of cattle, sheep and poultry—and as a drench for sheep.

2. BLACK LEAF 155—for spraying apples and pears to control codling moth, also for controlling grape berry moth.

3. BLACK LEAF DRY CONCENTRATE—used as a spray or dust—a dry powdered nicotine compound for easy mixing and handling.

4. BLACK LEAF 155 WITH DDT—for spraying apples and pears for the control of codling moth, leafhoppers, and similar pests.

5. BLACK LEAF 10 DUST BASE—meets the demand for a nicotine compound easily mixed with non-alkaline carriers to make a neutral dust.

6. BLACK LEAF CUNIC DRENCH—for sheep and goats. Formula recommended by U. S. Department of Agriculture.

7. BLACK LEAF POWDER AND PELLETS—for controlling the large roundworm (Ascaridia galli) in chickens.

8. MASH-NIC—for mixing with poultry feed to control large roundworm.

9. NICO-FUME LIQUID—for greenhouse spraying and fumigating—especially refined.

10. NICO-FUME PRESSURE-FUMIGATOR—spreads penetrating fumes under pressure—controls aphids and similar insects in greenhouses.

PROTECTION FOR FARMERS . . . PROFITS FOR DEALERS

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LOUISVILLE 2

KENTUCKY

PACIFIC SLOPE MEET

(Continued from Page 47)

Equipment in the Application of Low-Volume Sprays in California." He

20 x 20 x 20 feet or 8000 cubic foot volume, the rate of travel should not exceed three-quarter miles per hour; and so on. Foliage interference and other factors will increase still further

cations with these new machines, he explained. It is necessary for owners and operators of air-carrier sprayers to regulate carefully the number of gallons per tree by adjusting the spray nozzle discharge system, rather than by change in speed of machine travel.

Ten to twelve miles per hour air velocity is sufficient to place or impinge the spray droplets in both upper and lower leaf surfaces and on all sides of the branches. If the air velocity is too low the spray merely drifts and is wasted. Careful experimentation should be carried on to obtain optimum gallonage dilution, air direction, droplet size, arrangement of nozzles for deposit without run-off and uniformity between top and bottom of tree. Variation in evaporation with varying humidity has shown marked effect upon types of deposits and deposit retention. Volume must be reduced only to run-off, otherwise drying impairs coverage.

Mr. Newcomb used other illustrations to show one of ten high capacity air carrier sprayers which have replaced all conventional high pressure sprayers in use in DiGiorgio Fruit Corporation pear orchards. These machines have reduced the spray labor cost from six mills per

TABLE 1
Volume Discharge Required to Spray One Tree at Rates of Equipment Travel

TRAVEL M.P.H. Ft. Per Min.	TREE MEASUREMENTS IN FEET				
	10x10x10	15x15x15	20x20x20	24x24x20	30x30x25
	1000	3375	8000	11520	22500
½	44	4400	9787	17600	20736
1	88	8800	19574	35200	41472
1½	132	13200	29361	52800	62208
2	176	17600	39148	70400	82944
2½	220	22000	48935	—	—
3	264	26400	58722	—	—
3½	308	30800	68509	—	—
4	352	35200	—	—	—

Volume Discharges Beyond These Figures Are Unobtainable In Any Machine Presently Available

TABLE 2
Dilution of Spray Chemicals Used in Bulk and in Low Volume Sprays

SPRAY COMPOUND	BULK SPRAY	LOW VOLUME SPRAY
OIL EMULSION	5 Gallons	8 Gallons
EMULSIVE OIL	4 Gallons	6.5 Gallons
LIME SULFUR SOLUTION	3 Gallons	4 Gallons
WETTABLE SULFUR	4 Pounds	6 Pounds
NEUTRAL COPPER	1 Pound	2 Pounds
DDT—WETTABLE	2 Pounds	3 Pounds

called attention to the fact that development and sales of newly designed sprayer equipment and economic poisons have been so rapid that research essential to correct design and formulation has fallen behind. However, the effectiveness of air-carrier spraying with a discharge of sufficient volume of spray-laden air at a given rate of equipment travel completely to displace all the air within the body of the tree has been proved conclusively. Mr. Newcomb used slides to illustrate the volume of discharge of air required for various rates of travel and certain tree sizes.

Assuming a 30,000 cubic foot per minute volume discharge as machine capacity, in spraying trees having dimensions of 10 x 10 x 10 feet or 1000 cubic foot volume, he said, a rate of machine travel of not over three-and-a-half miles per hour would probably be effective. However, for a tree measuring 15 x 15 x 15 feet or 3375 cubic foot volume, the rate of travel should not exceed one-and-one-half miles per hour; for a tree measuring

the required discharge volumes. These figures indicate why there are so many poor and irregular spray appli-

TABLE 3
Amount of Oil Deposited on Bark of Pear Twigs

Applied as	Type of Oil Used	Gallon Actual per 100	Number Trees		
			Oil Applied Per Tree	Gals. Sprayed per 100	Milligrams Oil Deposited Per Square Inch
Bulk Spray	83% Oil Emulsion..	5	0.373	11	2.83 3.10
Bulk Spray	99% Emulsive Oil ..	4	0.356	11	4.11 4.20
Bulk Spray	100% Tank Mix Oil	4	0.36	11	4.20 4.37
Low Volume	83% Oil Emulsion..	8	0.166	40	3.10 3.56
Low Volume	99% Emulsive Oil ..	6.5	0.160	40	4.39 4.57
Low Volume	100% Tank Mix Oil	6.5	0.160	40	4.47 5.03

TABLE 4
Per-Acre Cost of the Materials of Dormant Oil Spray Applications On Pears Planted 90 Trees Per Acre

Type of Oil Used	Price Per Gallon	Bulk Sprays		Low Volume	
		Gals./100	Cost	Gals./100	Cost
Flowable Oil Emulsion	\$0.18	5	\$7.29	8	\$3.24
Emulsive Oil	0.18	4	5.83	6.5	2.63
Tank Mix Oil	0.14	4	4.53	6.5	2.05

spray gallon by conventional applicators to 1.2 mills, even when using the high gallonages required for lead arsenate. The speaker presented tables to illustrate data gathered from experiments in California.

On the social side, an informal get-together was held on the Sunday evening preceding the meeting, with entertainment being furnished by the economic poisons industry.

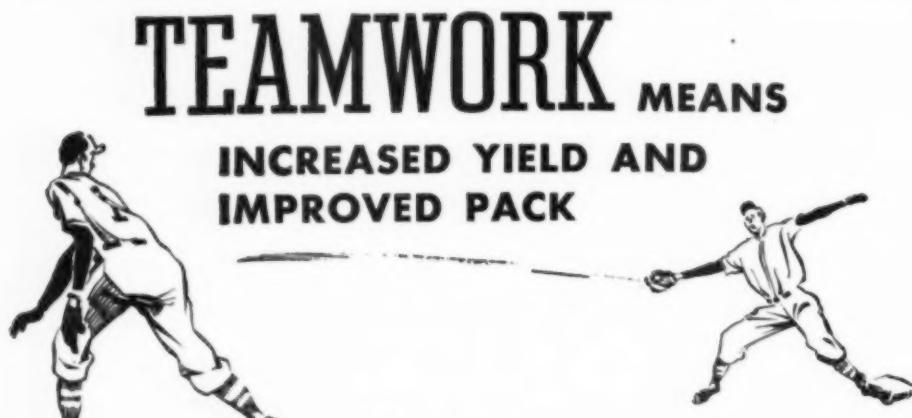
tries of both the U.S. and Canada. A dinner dance was held on the evening of June 15, and the ladies present were taken on sight-seeing tours and an evening cruise.

The Canadian Committee on Local Arrangements, under the chairmanship of James C. Barr, president of Commercial Chemicals, Ltd., Vancouver, spearheaded the hospitality of the hosts. Other members of the com-

mittee included L. M. Godfrey, Walter A. Leckie, C. McLean and H. F. Olds. The U.S. Committee, working with the hosts, was comprised of Wm. J. F. Francis, chairman; R. S. Braucher, C. E. Graves, and Ed. Littooy.

Program committee comprised E. J. Newcomer, chairman, G. E. Carman; James Marshall; W. M. Hoskins; H. E. Morrison; G. F. Knowlton and G. J. Spencer.

The remainder of the meeting will be reported next month. This report will discuss a number of papers, and symposia on "New Insecticides" and on mites attacking crops.



MODERN farming is an exact science. The most successful operation has the right combination—a balanced line-up of essential factors. Like all teams, there are certain "stars"—those who provide the punch and make success more certain. We invite you to scan this agricultural "program" and spot the ones to watch:

The Line-up

- Soil
- Fertilizer
- Seed
- Nursery stock
- * EQUIPMENT
- * INSECTICIDES
- * FUNGICIDES
- Management
- Labor

Here are your Star Performers—

Niagara CHEMICALS and DUSTERS

Niagara insecticides and fungicides and Niagara equipment have gone through extensive "training" to win for you. Thorough research and exhaustive tests have taken out all the guess-work. "When you buy Niagara, you buy protection" is not a slogan—it's a

proved fact, accepted by top growers, large and small, from coast to coast. Expert formulation—modern materials—time proven effectiveness and reliable manufacture are behind every Niagara product. Get 'em on your team.



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EXPERIMENT STATIONS

(Continued from Page 55)

insecticide holds promise for spinach growers."

Arkansas' report includes also this interesting observation on the practical, economic value of the use of insecticides:

In a study with swine it was discovered that while pigs infested with lice lagged behind non-infested pigs during their first few weeks of growth, at the end of 75 days they weighed exactly the same. However, more corn and tankage were required by the untreated pigs, with the result that for each infected pig grown and fattened from weaning size to market weight, there was a loss of approximately \$1 at normal prices and \$2 at present prices.

Idaho Report

Outstanding in the report of the Idaho station at Moscow is a progress report dealing with the effect of the weed killer, 2,4-D, on soil nitrogen fixing bacteria. This study was deemed important because, as the report explains: "Any compound added to the soil that would inhibit the bacteria that work with the legumes to fix atmospheric nitrogen would cancel out the value of legumes as soil-builders in rotation."

"In laboratory studies," the report continues, "it was found that concentrations of 2,4-D above 0.3 percent have a decided inhibitory

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effect on the legume bacteria. Also, the aluminum salt appears to be more toxic than the sodium salt."

Further light is expected to be shed on the advisability of using 2,4-D on legume crops from a greenhouse study, now in progress at the Idaho station, on the effect of 2,4-D on nodulation of peas, beans, alfalfa and red clover.

However, the Idaho investigators report good results from low concentrations of 2,4-D for control of some annual and winter-annual weeds in cereal crops. Rates as low as 0.3 and 0.6 pounds per acre on the pure acid basis gave good control of crowfoot infestations in winter wheat. In some instances wheat yields were increased as much as 10 bushels per acre as a result of spray applications. The Idaho report also includes a table grouping of various perennial weeds on the basis of average spring recovery following treatment with 2,4-D the previous season. Another table lists the amount of 2,4-D required per acre for control of annual weeds when small.

Following up previous experiments which had demonstrated that spraying sheep with a DDT water suspension spray for sheep tick and wood tick control is practical and economical, the Idaho investigators devised an automatic spray boom with ten nozzles to make the method more appealing to owners of large range bands. With this, sheep can be treated at the rate of 60 per minute. Range ewes coming through the winter after this treatment, entered the lambing sheds in excellent condition, while wool from sprayed sheep brought top market prices, the report claims.

South Dakota Report

SOUTH Dakota station at Brookings reports at some length on tests with chlordane and toxaphene for control of grasshoppers. Both compounds, when properly applied, either as a wet spray or dust, and when applied at sufficient concentration per acre, will give better than a 99 percent kill of grasshoppers, says the report, which adds: "Both chemicals gave us about the same percentage of kill, but chlordane, we be-

lieve, has longer lasting qualities. Further, chlordane seems to have a definite repellent effect, even after its killing ability has disappeared."

It was decided, however, further work is required to determine how toxic chlordane and toxaphene, sprayed or dusted on alfalfa, or small grain, or grass, might be to cattle, sheep, hogs or horses that feed on such foliage and how long after application the foliage would remain toxic to livestock.

Results of numerous entomo-

logical investigations at the Baton Rouge, Louisiana experiment station are told in the following quoted headlines from sections of the annual report.

"Benzene hexachloride shows promise in controlling several major cotton insects." "Timely application of DDT controlled the boll worm." "Three new insecticides, BHC, '3956,' and 'Ryanex,' compare favorably with cryolite for sugar cane borer control." "Production of summer-planted squash possible

GEIGY NOW ADDS 3 NEW PESTICIDES TO THE LINE THAT MADE DDT FAMOUS



And don't overlook these widely used Geigy DDT compositions. They also represent opportunity to manufacturers and processors of packaged insecticides for the retail trade.

NEOCID® D-30

A solution containing 30% Geigy DDT (by weight) for dilution with liquids, to control flies, mosquitoes, bedbugs, cockroaches, fleas and certain other insects.

GESAROL® VD-50

A finely-ground powder containing 50% Geigy DDT. For general agricultural use after addition of diluents to formulate DDT dusts adapted to control specific pests.

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*Reg. U.S. Pat. Off. Insecticidal Compositions containing DDT are covered by Reissue Patent No. 22,922

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DDT
INSECTICIDES

through use of cryolite," . . . "A more desirable form of nicotine was found for use in cucumber dust formula." . . . "DDT and cryolite successful in controlling tomato fruitworm." . . . "Insects on summer-planted corn controlled with benzene hexachloride."

There is a section in the report regarding use of 2,4-D for eradicating field hosts of the sweet potato weevil and another section deals with comparison of cryolite, DDT, BHC and "1068" for control of velvet caterpillars on soybeans. In 1946 this insect infested 300,000 acres of soybeans in Louisiana, also large acreages

of peanuts, crotalaria and velvet beans and insecticide manufacturers were called on to supply about 57,000 pounds of insecticides to combat this one pest, the report reveals.★★

NFA CONVENTION

(Continued from Page 34)

nature are becoming so dangerously exhausted that from now on . . . these lands will absorb fertilizer profitably." He emphasized the importance of moisture in the soil to make available the various plant foods, stating that it becomes "a most vitally limiting

factor on potential expansion of fertilizer use," as well as in expanding food production. "The fertilizer industry should be more awake to the import of a sound soil and water conservation program as a prerequisite to a maximum expanded use of fertilizer." In describing a "sound soil program," Mr. Sanders stated that soil fertility must be maintained, and the soil kept at its original status as far as possible. A sound water program demands that maximum use of water be made first in the soil on which it falls; second as run-off water; and that the run-off be accomplished with minimum damage to the soil.

Mr. Sanders concluded by re-emphasizing the important role of fertilizer materials in the future, stating that the industry must clearly foresee this future trend and not hesitate to provide for these expanded needs. He stated, however, that the need for more materials is current; that American agriculture needs fertilizer relief under present conditions. "We (the Grange) insist that a constructive fertilizer industry will meet adequate current needs and will fight along with the farmers for a stable equitable income for farmers that will maintain a profitable heavy demand for fertilizers by farmers," he said.

In thanking Dr. Sanders, Chairman Noble expressed the industry's interest in having the views of such farm organizations as The National Grange. At the same time, he spoke of the industry's pride in having doubled its production, as compared with the 1935-39 pre-war average, as long ago as 1946 and in having increased that production even more in 1947. This job has been done, he said, despite frequent labor, materials and transportation handicaps outside the industry's control. The automotive industry and others such as steel, radio, refrigerators and lumber, Chairman Noble pointed out, are only now at about prewar production levels.

The fertilizer industry is still moving forward with the aim of further increasing production to unprecedented levels and is bearing in mind its responsibility for meeting farmers' needs, Mr. Noble added.

2,4-D
2,4-Dichlorophenoxyacetic Acid
Sodium Salt
Triethanolamine Salt
Isopropyl Ester
Butyl Ester

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DDT
Dichlorodiphenyltrichloroethane
100% technical grade

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**ALPHA NAPHTHA-
LENEACETIC ACID**

Kolker Chemical Works, Inc.
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Manufacturers of Basic Agricultural Chemicals

Wheeler McMillen, Editor of *Farm Journal* declared in his talk that although the future will demand higher production from the present farm acreage of the United States, he is inclined to challenge the pessimists who look upon the expanding population of the world as a threat to the food supply. "Anyone well acquainted with American agriculture has long known that the application of the best existing practices could substantially increase the output of the farms in virtually any county or township," he said, and continued with "The application of the best approved combinations and quantities of fertilizer alone, on all our presently productive farm lands would increase the output tremendously . . ."

Mr. McMillen also cast doubt on the idea expressed in some quarters that men already know a great deal of all there is to learn about agriculture. He stated that he would not be surprised "if someone comes along to show us how to make new top soil in a few months or years instead of letting . . . nature take four hundred or a thousand years for that purpose. He said that expanded knowledge will "in our time" double the productive vigor of seeds; and that new uses for farm products are likely to be discovered to encourage maximum production. Entirely new plants are likely to be brought into our crop list, to be used for new purposes, he predicted.

He pointed out the advantage of working with the kingdom of plants rather than with minerals which do not reproduce themselves and are not reproducible. Plants, he asserted, can renew a store of raw materials each year, and the entire production, except for the seed supply, can be consumed, then replaced again.

Soil Economics Discussed

SOME implications of Soil Fertility" was the title of a talk Wednesday morning by Howard W. Selby, general manager, United Farmers of New England. Mr. Selby reminded that soil is the basis of agriculture, and that the science and art of cultivating the fields and soils are

the "basis of our national life and prosperity." He pointed out the apparent relationship between soil fertility and human health, and expressed fear that since the trend is toward larger and fewer farms, the tempo has stepped up until the farmers of America are faced with a competitive struggle which has caused many to mine their land rather than to manage it. This causes leaching of minerals from the soil, which deprives plants of their benefits and

prevents the consumer from deriving the proper nutrition from his food.

Regarding conservation, Mr. Selby declared that "animal life in all its forms, forests and other plant life, water sources and fertile soils all are being destroyed at a faster rate than they are being replaced." He emphasized the importance of fertilization in rehabilitation of the soil of the nation. "Throughout the fertilizer organizations there is opportunity for continuing study and re-

The advertisement features a central graphic of a white circle containing the text "Today's Best Buy". To the right of the circle, three product boxes are displayed diagonally:

- WEED DESTROY 24D PRODUCTS**
1. Butyl Ester
2. Amine Salt
- RIVICOL CHLORDANE**
Emulsion
Wettable Powder
Dust
- RIV-TOX DDT**
Emulsion
Wettable Powder
Dust

Below these boxes, the word "DEPENDABLE" is printed in bold capital letters. Underneath the boxes, the text "RIVERDALE" is written in large, bold, sans-serif letters. Below "RIVERDALE", the text "WEED KILLER AND INSECTICIDE PRODUCTS" is centered. At the bottom of the graphic, the phrase "For Every Need" is written in a smaller font.

In the lower right corner of the main graphic area, a rectangular box contains the text "Complete Your Line" and "WRITE OR WIRE!"

At the very bottom of the page, a horizontal bar contains the text "PRODUCTS AVAILABLE FOR PRIVATE LABEL" and "MANUFACTURED BY RIVERDALE CHEMICAL CO., HARVEY, ILLINOIS".

search as well as increasing the sales and distribution phases which make these products available to the users of the essentials of soil enrichment," he told the group.

The economic implications of fertility were discussed by Mr. Selby who stated that more attention paid to the fertilization of dairy pastures will result in production of greater yields per unit. He declared that the dairy industry of New England is particularly interested in the "green pastures" program. "Better pastures pay big dividends immediately," he noted, and "We are exploring the possibilities of growing more roughage and pasture crops on New England soil with a view to increasing the economic efficiency of milk . . ." He asked the fertilizer industry to show how the use of extra fertilization can help accomplish the twofold aim of dairy farmers: lowering costs of milk production, and improving the quality and nutritional value of the end product. The speaker expressed an opinion that this could be done

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U. S. Phosphoric Products Div., Tenn Corp., Tampa
United States Potash Co., N. Y.
Werthan Bag Corp., Nashville

through the application of fertilizer.

Ray L. King of Georgia Fertilizer Company, Valdosta, Ga. was elected chairman of the N.F.A. Board of Directors for 1948-1949, succeeding Weller Noble of Pacific Guano Company, Berkeley, Calif. who has served for two years. C. T. Prinderville, vice-president of Swift & Co., Chicago, Ill. was chosen vice chairman of the Board. D. S. Murph was re-elected secretary and treasurer.

The following were elected directors: James W. Dean, Knoxville, Tenn; J. H. Epting, Leesville, S. C.; M. G. Field, Hattiesburg, Miss.; E. A. Geoghegan, New Orleans, La.; A. W. Higgins, Presque Isle, Me.; Maurice H. Lockwood, Chicago, Ill.; C. R. Martin, Dayton, Ohio; Walter E. Meeken, Boston, Mass.; John A. Miller, Louisville, Ky.; J. H. Owens, Roanoke, Ala.; C. T. Prinderville, Chicago, Ill.; E. S. Russell, South Deerfield, Mass.; A. A. Schultz, Reading, Pa.; H. A. Thullberg, Haines City, Fla.; and A. W. Weaver, Norfolk, Va. ★★

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For some of its most exacting needs.

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Cube Resins — with definite Rotenone Content

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LABELING PROBLEMS

(Continued from Page 35)

quate precautions must appear on the label to warn of their hazards. Dust products are known to drift for great distances and they may cause injury to beneficial broadleaf plants and crops at a distant point from where the dust is applied. Dusting by airplane in the vicinity of susceptible crops should be avoided; however spraying by airplane is less hazardous as sprays are less apt to drift. Herbicides containing 2,4-D should not be stored near or transported with seeds, fertilizers, fungicides, or insecticides, since they may become contaminated and cause injury to crops. Sprayers and dusters used to apply 2,4-D herbicide should not be used for other purposes, or if used must be cleaned thoroughly with suitable chemicals. Vapors from esters of 2,4-D may injure crop plants in the immediate vicinity and this should be stressed when giving directions for applying them to weeds in orchards and vineyards.

The labels of fungicide and herbicide products should contain adequate directions for use against the diseases and weeds intended to be controlled. The directions should indicate the measured amount of the product to add to 1 gallon or 100 gallons of water or other liquid to make a spray, and it should give an acceptable rate of application in gallons of spray or in pounds of dust to use per acre. Herbicides containing 2,4-D used on agricultural crops, should give the rate of application in terms of pounds or fractions of pounds of 2,4-dichlorophenoxyacetic acid equivalent per acre. Fungicides used as wood preservatives against wood-rotting fungi should give directions to saturate the wood by dipping, and when brush or spray treatment is recommended, that two or more coats should be applied to saturate wood that comes in contact with the soil. Herbicides are often recommended to kill weeds and woody plants along ditch banks, irrigation ditches, ponds, and streams. Labels for such use should call attention to the hazard of contaminating water

used for irrigation or domestic purposes.

Words on the label such as "sterilize" and "sterilization" should not be used. In the minds of those dealing with plant diseases, sterilizing soils means freeing the soil of all plant life including spores. The use of this term in the closely allied herbicide field to mean only rendering the soil unproductive is likely to lead to confusion. The words "eradicate," "eliminate," and "exterminate" are objectionable unless appropriately modified.

Words less broad in scope, such as "controls," "reduces," "kills," and "destroys," are acceptable.

The new Act states that "The term 'misbranded' shall apply to any economic poison if the label does not contain a warning or caution statement which may be necessary and, if complied with, adequate to prevent injury to living man and other vertebrate animals, vegetation, and useful invertebrate animals." In addition, the regulations describe what constitutes "highly toxic" poisons.★



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Sprajet Sr. nozzle tips are interchangeable with all types of nozzles. Are easily cleaned if ever clogged without danger of losing parts. Sprajet Sr. nozzles are obtainable in $\frac{1}{4}$ ", $\frac{3}{8}$ " (male or female) 65.067 and many other sizes to meet every spraying need.



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The following features are scheduled for subsequent issues of Agricultural Chemicals.

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- "Future Prospects for 2,4-D"
- "The American Potash Industry"
- "Application Equipment for Pest Control"
- "What the Dealer Should Know about Weed Killers"
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Requests for information will receive immediate attention.

LISTENING POST

Continued from Page 15)

indicated that late blight was spread over the southern half of Charleston County, where most of the state's potatoes are grown, and was in a position to cause severe damage with the occurrence of a single wet cool period. However, no such weather developed and no visible advance took place during the remainder of the month, although lesions continued to show some spores each morning. Some spread occurred during a rainy period in the first week of May. The disease had not reached serious proportions, however. None has been found in Beaufort County.

On tomatoes, general light infection was found May 11 in a 30-acre field on Johns Island in Charleston County.

In Virginia, tomato late blight was found in Northampton County, on the southern tip of the Eastern Shore, on April 27, on plants shipped from southern Georgia and set out about two weeks previously. About twelve acres had already been plowed up. The disease was difficult to diagnose at first since the plants were in poor condition, but cultures showed growth of the fungus. The grower had dusted with a copper dust since the plants were set out, but evidently the prior infection nullified the effect of the dusting.

Tobacco Blue Mold

ALTHOUGH spread was slow, most untreated beds in South Carolina were affected a month after the first appearance of blue mold on March 15. Surveys showed infection just starting in most beds April 9, and most spread took place after a cool rainy period April 10 to 12. Since then warm weather allowed recovery and no serious delay in transplanting occurred. Most of the crop was being set out during the last two weeks in April. Apparently fewer growers used treatment this year, probably because of the light attack; about 4,000 of 17,000 yards of plant beds observed in two surveys were

being treated. Striking contrasts were observed in several locations between large vigorous plants on treated beds and delayed infected plants on untreated beds. One county agent reported that some growers deliberately allowed infection of their beds to hold back their plants, a hazardous practice if conditions should have become favorable to the disease.

In North Carolina, by the middle of April, blue mold was present over the eastern half of the state except

in the northeast. Damage generally was light to moderate, with severe injury and killing of plants in a number of isolated cases. If weather remained warm no serious trouble was anticipated. Transplanting was being started in the southern counties. On some farms transplanting delay would be caused by blue mold, but at the time of the last report (April 17) most of it, especially in the old belt, would be due to frequent rains holding up land preparation. "Fermate"

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STICKER

CP-5 dust sticker consistently shows higher dust deposits and longer retention under field conditions. Substantial increases in control are being obtained with CP-5. Improves handling of fruit and vegetable dusts.

Be sure of higher deposits this season!

CP-5 is an economical, dry, free-flowing powder for incorporation with dusts. Make your dusts more effective this season with CP-5 dust sticker. Write today for information and samples.

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Spreaders • Deposit Builders • Stickers for Agricultural Sprays and Dusts

spray or dust was being widely used with good results where properly applied. At five locations in Lee County blue mold was observed to be more severe in beds on old sites and infection apparently had originated first in old bed sites. In Moore County a striking situation was noted: in a plant bed on one side of a creek where the Uramon-Cyanamid treatment had been used last fall, weed control was excellent and little blue mold was observed; whereas in a bed across the creek where no weed control treatment had been used, weeds were rampant and blue mold was severe.

In Virginia blue mold has been reported in five southern counties, Halifax, Pittsylvania, Mecklenburg, Brunswick, and Nottoway, first reports being received about the middle of April, although some evidence indicated that the disease had been present in the region for ten days or so, perhaps as early as April 4 or 5. Warm dry weather prevented serious damage. Plants were in good condition

and setting out was starting by the first week of May.

In Maryland blue mold has been reported in Anne Arundel, Calvert, Saint Marys, and Prince Georges Counties. Weather following first observations, on April 23 in Anne Arundel and Calvert Counties, was favorable to the disease, with cool temperature and some rain or drizzle on most days. However, damage was slight up to the first part of May, the general use of "Fermate" apparently preventing serious attack.

Blue mold was first found in Tennessee on April 30 in Green County. During the first week in May conditions were ideal for its development and it was widespread over the Burley area, but was generally being well controlled.

In Kentucky the disease was first found April 27 in Simpson County in second-year beds. Up to May 10 scattered infections were reported in several counties, but no serious injury was caused.★★

BOOK REVIEWS

(Continued from Page 39)

haven, the corn was parched and dry, for without water the "chemical" fertilizers could not nourish the crop. (Shame on these "chemical" fertilizers! Think how much better nature's own fertilizers would have done under the same conditions.—Ed.)

Malabar Farm is interesting, albeit disjointed,—a dreamer's dream of science and the soil and things. We conclude that Senor Bromfield should leave agriculture and science alone. He should write about love and animals. (But take a tip, Friend Louis, don't trust that Shorthorn bull too far. One of these days he'll double-cross you when you're not looking. We know.—Ed.) So, take a look at the newest Bromfield creation. *Harper & Brothers* are the publishers. 405 pages \$3.75.—I.P.M.

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DEALERS REPORT

(Continued from Page 38)

large quantities of a new insecticide, so that when the State Experiment Station suddenly recommends a given preparation, a shortage immediately exists. Such erratic situations, although not difficult to understand, make it "tough on the dealer," as Mr. Cock put it.

The Co-op branch handles not only insecticides, fungicides and weed killers, but fertilizers as well. Fertilizer sales have increased tremendously during the past years, Mr. Cock reported. He expressed optimism about the future of the business, too, stating that the farmers will never go back to scanty use of the material. The outstanding results have convinced nearly every farmer of the benefits from generous application.

Perhaps the most significant trend in this direction is in the fertilization of pasture lands which Mr. Cock described as becoming "routine" in that area. He said that obvious benefits are gained by dairy and beef farmers, and that the increases in both milk production and the quality of beef raised on fertilized land more than justify the extra effort involved. Pasture fertilization is here to stay, in the opinion of the Co-op manager.

Regarding 2,4-D, many people have been somewhat hesitant to use it, since they know of certain bad results from unwise applications. However, the saving of high-priced labor in the use of chemicals for weed control has overcome much of this fear, and numerous farms are now spraying 2,4-D rather than hiring added hands to cut weeds with scythe or mower. Moreover, the chemical method retards the re-appearance of weeds while cutting is strictly a temporary relief.★★

A. P. F. C. MEETING

(Continued from Page 29)

a cow and feed a calf on the cow's milk. After being on such a diet for a month, the calf's bones could be analyzed for total radiophosphorous. From the data we could calculate the amount of phosphorus in the calf's

bones that came from superphosphate. "This procedure, he explained is known as the "tracer technique" in general use in numerous fields of research.

Important contributions to the radio-phosphorous research program have been made by the fertilizer industry, he stated. "Radioactive phosphorous is an excellent tool for use in studying the relative efficiency of different phosphate fertilizers," he said. "We plan to use it extensively for

that purpose. To this end, facilities have been developed for the production in radioactive form of most phosphates of immediate and prospective interest to the farmer and the fertilizer industry," he concluded.

Appearing on the program at the annual A.P.F.C. banquet, Dr. Francis P. Gaines, president of Washington and Lee University, Lexington, Va., told some 500 members and guests that "America's wastage of land is not far short of a national

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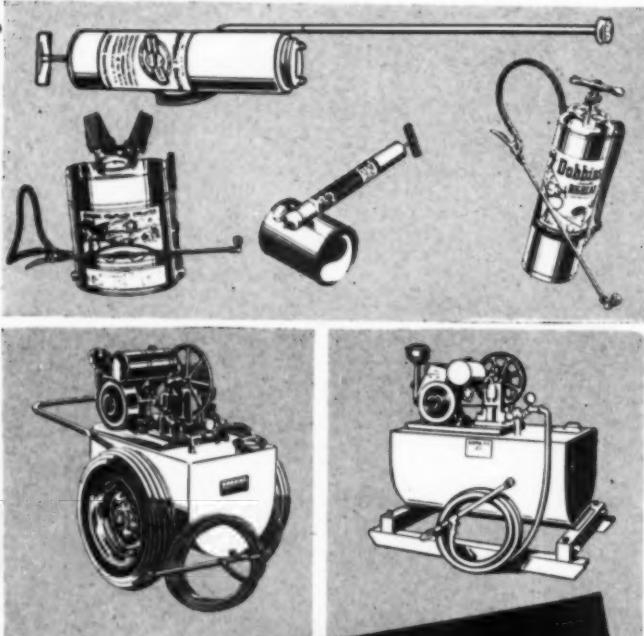
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disgrace, and the reclamation of our land is perhaps our foremost problem, economic, social, and political."

He charged that because the land was plentiful; because in many areas of the nation ignorant practices were employed for generations; and because democracy itself, lacking the agencies of coercion that despotism uses, relies merely upon education and persuasion, we have despoiled the land as no other people ever have done.

"The soil was the first frontier, remains the foremost frontier, and will perhaps be the final frontier of our dreaming," he emphasized. "To conquer this frontier, to make this frontier friendly and serviceable again, is to make our own economy secure," he said. "No civilization is even approximately safe that does not derive from productive soil."

Since it is hunger that drives men to desperation, and makes them cheerfully accept slavery, Dr. Gaines pointed out that the conquering of this frontier of our wastelands may save the world. "Only a world that has been set free from hunger will ever accept our ideals of freedom and of justice and of peace," he concluded.

The A.P.F.C.'s third annual meeting attracted the largest registration in the Association's history, with 441 members and friends in attendance. According to Clifton A. Woodrum, A.P.F.C. president, The Greenbrier meeting was considered the "most successful yet."

FUNGICIDE DEALERS

(Continued from Page 25)

ently more effective to be used at lower rates.

It is unfortunate for all chemists, that most of the organic fungicides have complex and involved chemical names. However, so far, only by the use of these names can the materials be surely identified and products sold under different trade names be found to be either essentially similar or different. This can be determined of course by examining the active ingredient statement. A movement is under way at present to give these organic fungicides common or

trivial names, as has been done with a few insecticides, so that they may be readily identified in the trade by manufacturers, dealers, growers, and plant pathologists. The usual trade names will of course be carried in addition. In the meantime for the sake of orientation the chemical names will be given in this discussion. Because of the relatively large number of compounds, we can mention only the more prominent and interesting ones.

Unquestionably the outstanding group of organic fungicides are those derived from dithiocarbamic acid and commonly called the dithiocarbamates. This is a most versatile group of fungicides and one or more of the various preparations have given good results in practically all fields of agricultural fungicidal application; as sprays or dusts for fruit and vegetable crops, for ornamentals and trees, as seed treatments and as turf fungicides. However, it is still necessary to use the appropriate one for the specific disease in hand! The first compound was tetramethylthiuram disulfide which is known under the various trade names of "Thiosan," "Tersan," and "Arasan." It has also been called "TMTD." "Thiosan" or as now known, "Tersan," is a wettable preparation used primarily for turf diseases on greens and lawns. "Arasan" is a dust, very effective as a seed treatment particularly for vegetables, peanuts and ornamentals. Since this dust is irritating to some people, a slurry form "Arasan SF" has been developed for seed treatment. The iron and zinc salts a derivative of dithiocarbamic acid namely, ferric dimethylthiocarbamate, and zinc dimethylthiocarbamate, have attained considerable use. The iron salt is sold as "Fermate" and "Karbam black," and the zinc salt as "Zerlate," "Methosan" and "Karbam white." "Fermate" has been found particularly effective as a fruit spray and is compatible with most insecticides and fungicides excepting those containing copper, mercury, and lime sulfur. The zinc salt on the other hand has given the best results on vegetable crops. Its compatibilities are about the same as the iron salt. Both salts have been

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used successfully on a variety of ornamentals. The iron salt is unusually specific and effective for the fungus rust diseases. The third group of dithiocarbamate fungicides are the ethylene bisdithiocarbamates. The first of these to attain prominence was the disodium salt, known as "Dithane." More recently the zinc salt has been prepared and sold as "Dithane Z-78," and "Parzate." The reputation of these preparations has been built up largely as potato sprays, though disease control has also been attained on various vegetable crops.

Two quinone compounds, with trade names of "Sperton" and "Phygon" have been giving interesting results in a variety of applications. The active ingredients are respectively tetrachlorobenzoquinone and dichloronaphthoquinone. "Sperton" is primarily for seed treatments and is unusually non-injurious to seeds. It has proven most effective for peas and lima beans. "Phygon," a newer product is still somewhat in the experimental stage but has been used as a spray with some success on apples, other fruits, vegetables, and ornamentals, and also as a seed treatment.

Another group of organic fungicides are the quinolinolate derivatives. Possibly the most promising of these are the "Bioquin" series especially those with copper 8-quinolinolate or zinc 8-quinolinolate as the active ingredients. In preliminary laboratory and greenhouse tests copper 8-quinolinolate has been unusually effective against a variety of fungi and diseases. Limited field tests on apples and other crops indicate promising results. "Isothan Q15," a quaternary ammonium compound, chemically identified as lauryl isoquinolinium bromide, has shown only fair results to date.

Certain glyoxalidine derivatives have been tested as foliage fungicides principally on cherries where they have shown promise. The results on apples have been encouraging but were erratic apparently due to difficulties in formulation.

Phenol has long been known as a standard bactericide but a very weak fungicide. Recently various phenolic derivatives have been intro-

duced as agricultural fungicides. One of the first of these was "Elgetol" which contains as the active ingredient, sodium dinitro-o-cresolate. This chemical has found extensive use as a ground spray or eradicant in apple or other orchards. It is applied to the ground while the trees are dormant to kill scab and other fungi overwintering in the dead fallen leaves as well as insect pests. Various derivatives of trichlorophenol are being tried as seed treatments and are giving encouraging results; some of these included in the "Dowicide" series of fungicides.

Formaldehyde for long the only organic soil fumigant, seems likely to assume a less important role because of newer materials. Chief among these is chloropicrin, a tear gas, which is sold in the trade as "Larvacide." This material is an all round soil fumigant, unlike most of the other materials and functions as a soil fungicide as well as killing nematodes, soil insects and weed seed. However, it is very toxic to foliage and disagreeable and dangerous to handle, and expensive for large scale application. Special machines are used to dispense it. The next strongest material is methyl bromide which is marketed as "Isocobrome" and "Dowfume G." This is also dangerous to handle and ample ventilation is needed. At high dosages it is effective as a soil fungicide. Other soil fumigants are "DD" mixture, i. e. dichloropropane and dichloropropylene, and ethylene dibromide sold as "Isobrome D," "Dowfume W40" and "Garden Dowfume." "DD" mixture and ethylene dibromide, however, are primarily for the control of nematodes and wireworms and cannot be depended upon to kill soil infesting fungi.

It must be emphasized again that in this brief discussion of organic fungicides mention can be made only of the better established ones and some of the more interesting or promising of the more experimental preparations. Unfortunately, in some instances, strictly experimental fungicides have been placed on the market and the results have not always been happy for those concerned. Dealers

would do well to avoid such situations despite the pressure of enthusiastic but premature reports.

Specific Information

THE foregoing discussion has attempted to give the dealer a general background of technical information on fungicides which it is hoped will be helpful in gaining an overall picture.

However, the dealer's actual problems will be very specific ones, for many users of fungicides from the large grower to the backyard gardener depend on him for advice. Thus the apple grower might well ask should he change from wettable sulfur to some of these new organics and if so which ones. Again, a housewife will want to know what is the best spray for the mildew on her roses. It is impossible in an article of this type to anticipate and answer the hundred and more common questions that might be asked. The kind of questions of course will vary from locality to locality, but more important the answers will also vary, because what is the most suitable fungicide in one place and under one set of conditions is not necessarily the most appropriate in another.

This kind of information the dealer can most logically obtain from his county agent. If the county agent does not have a ready answer he may be able to provide one from the store of state and federal literature which he has at his disposal. Or he may put the dealer in contact with the plant pathologists at the state experiment station who directly or by means of the various appropriate bulletins and circulars on disease control can give the most up-to-date information on the use of fungicides for that part of the country. Experienced and successful growers may also supply excellent and timely information.

Dealers realize that things do not stand still and that fungicides are no exception. What may have been the best known treatment 10 years ago may not be the best today. As a dealer keeps up-to-date and provides both accurate information and suitable fungicide materials, so will his own business prosper. ★★

Industry Patents

The following patents have recently been issued by the U.S. Patent Office on products and devices in the agricultural chemical field. Copies of the patents may be obtained at 25c each by addressing the U.S. Patent Office, Washington 25, D.C.

Trade Mark Applications

TOXAPHENE, in sans serif capital letters, for active chemical ingredient for use in the manufacture of insecticides. Filed December 11, 1946, by Hercules Powder Co., Wilmington, Del. Claims use since December 4, 1946.

NITRAPO-TWO-IN-ONE PLANT FOOD—drawn letters on bag motif, for fertilizer. Filed Apr. 4, 1947, by Naco Fertilizer Co., New York. Claims use since Oct. 1, 1923.

YARDO, in black capital letters, for organic fertilizer. (dehydrated animal manure) Filed Aug. 29, 1947, by Union Stock Yards Co., Omaha, Nebr. Claims use since Oct. 1, 1946.

NITROS, in letter-spaced capitals, for chemical products for use as insecticides, fungicides, herbicides, and rodenticides. Filed July 12, 1947, by Monsanto Chemical Co., St. Louis, Mo. Claims use since April 15, 1947.

BLAIR'S, in circus style capital letters, for insecticides, disinfectants, and numerous medicinal uses. Filed Aug. 19, 1947, under section 2F of the Act of 1946, by Morton Manufacturing Corp., doing business as Blair of Virginia, Lynchburg, Va. Claims use since July 1, 1936.

INDUSPRAY, in script caps and lower case, set at an angle, for insecticides. Filed Oct. 7, 1947, by the Tanglefoot Co., Grand Rapids, Mich. Claims use since Aug. 20, 1946.

DEVEX D-50, in capital letters, for insecticide. Filed Oct. 17, 1947,

by Westvaco Chlorine Products Corp., New York. Claims use since Sept. 23, 1947.

TRIVEX D-50, in capital letters, for insecticide. Filed Oct. 17, 1947, by Westvaco Chlorine Products Corp., New York. Claims use since Sept. 23, 1947.

FLORAGLOW, in caps and lower case, for oily preparation for spraying plants having insecticidal and nutrient properties. Filed Dec. 8, 1947 by Floralite, Inc., Chicago. Claims use since Nov. 13, 1947.

BUMPERO, in tall capital letters, for inorganic fertilizer. Filed Aug. 13, 1947, by Farm Fertilizers, Inc., Omaha, Nebr. Claims use since July 18, 1947.

Industry Patents

2,440,781. INSECTICIDAL FUMIGANT COMPOSITION WITH SOLID RUBBER CARRIER PARTICLES Patent issued May 4, to C. W. Murray, Glenside, Pa., assignor to the U.S.A. as represented by the Secretary of Agriculture. A composition comprising a volatile liquid insecticide and a vehicle therefor consisting of dry hard rubber in finely divided form.

2,442,431. SLEEVE INSERTING DEVICE FOR VALVE BAGS. Patent issued June 1, 1948, to Harry Peters and Clyde D. Pierson, Middletown, Ohio, assignors to Raymond Bag Co., Middletown. In a mechanism for inserting a sleeve in the valve of a bag, means for supporting a valved sleeve, a sleeve inserting element movable toward and from a valve in said position, means for supporting a section of sleeve forming material in a position spaced from said valve and in the path of said inserting element, and means for actuating said inserting element to cause the same to engage

in said material and insert the same in said valve in sleeve form.

2,442,652. INSECTICIDES. Patent issued June 1, 1948, to Theodore W. Kerr, Jr., Seymour, and Walter D. Harris, Naugatuck, Conn., assignors to U.S. Rubber Co., New York. An insecticidal composition containing 2,2-bis (p-chlorophenyl)-1,1-trichloroethane and an alkenyl naphthyl ether having 3 to 4 carbon atoms in the alkenyl radical.

2,442,653. INSECTICIDES. Patent issued June 1, 1948, to Theodore W. Kerr, Kingston, R. I., and Walter D. Harris, Naugatuck, Conn., assignors to U.S. Rubber Co., New York. An insecticidal composition containing 2,2-bis (p-chlorophenyl)-1,1-trichloroethane and material selected from the group consisting of alkyl naphthyl ethers having 2 to 5 carbon atoms in the alkyl radical.

New Fertilizer Plant

The Arkansas Farm Bureau, Little Rock, has announced plans for construction of a \$400,000 plant to produce high analysis fertilizer. The new plant will be used to meet acute fertilizer shortages experienced by Arkansas growers. Present plans call for acid-treating Florida phosphate rock, mixing it with nitrogen from nearby plants, and with potash from New Mexico. It is estimated that 15,000 members of the co-op will be able to obtain an average of 250 pounds of fertilizer per acre with the output of the new plant.

Helicopters Spray DDT

Use of DDT applied by helicopter for control of the Black Fly was begun early in June at Old Forge, N. Y., in an effort to rid the surrounding resort area of the pest. Some 1,000 acres were treated from the air. Dr. Robert D. Glasgow, New York State entomologist and Dr. Ronald Collins, senior entomologist, as well as representatives of the State Conservation Department were present at the launching of the program.

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Chemist, Ph.D.: Expert in insecticides, fungicides, weedkillers, disinfectants, aerosols, etc., desires executive position with well established company. Also many years of experience in South America and Europe. Willing to travel. Address Box 261 care of Agricultural Chemicals.

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Salesman: Ten years experience household and agricultural insecticide fields both raw material and packaged goods plus sanitary sales experience, good record, desires change for larger potential and responsibilities. Address Box 263 care of Agricultural Chem.

Horticulturist, M. S.: Conscientious; 14 years diversified experience in field, laboratory and administrative capacity with chemical aids to agriculture. Address Box 264 care of Agricultural Chemicals.

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TALE ENDS

Dr. B. D. Cloaninger, fertilizer inspector for the State of South Carolina tells of the suspicion with which he was eyed on a recent sojourn into the hills of his state. Noticing the coolness of his welcome in the community, he asked a native why a representative of the U.S. Department of Agriculture should be viewed with hostility. "Department of Agriculture?" replied the native, "Why, we thought that 'U.S.D.A.' on your car stood for U. S. Dry Agents."

Stephen S. Easter, Food and Agriculture Organization of the United Nations, visited the Agricultural Chemicals office in New York recently upon his return to the U. S. from a three-month sojourn in Egypt, Italy, and other countries. He told about "pest control" methods used in some areas where labor is so inexpensive that growers hire large crews of boys to go through the fields to pick the eggs of insects from leaves just before the insects emerge. Insecticides there are relatively high priced, and methods of application are often wasteful and extremely primitive. He observes that a great deal remains to be done in pest control progress in many areas abroad.

Following the NFA banquet at The Greenbrier, William Hazlett Upson, who addressed the convention earlier, continued to expound his views on "Ergophobia" to a small



"Now dat we has learned dem de game, Cuthbert, leave us depart!"

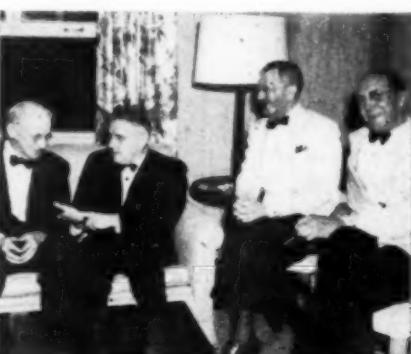
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group. Mr. Upson (center) puts a point across to Daniel S. Murph, NFA secretary, while Weller Noble, retiring chairman of the board, and Maurice H. Lockwood listen in.

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THE
GRASSHOPPER



BUG OF THE MONTH

...controlled with BHC, CHLORDANE, TOXAPHENE

GRASSHOPPERS in teeming swarms have chewed a path through all of recorded history. From the Biblical "plague of the locusts" to the worldwide infestations this year, they have brought famine and death to millions of human beings.

With the new chlorinated toxicants, however, remarkable control can be achieved, far beyond any earlier experience. These new-type poisons appear to be so remarkably effective because they are slowly volatile. They not only kill as the bait is eaten, but tend to deplete the hordes by contact and

fumigant action in addition.

Toxicants of this type which have been successfully used are BHC, Chlordane, and Toxaphene. Prentiss offers concentrates based on all three, in the complete line of Prentox Pest-Tested Insecticide Concentrates.

We suggest that you investigate the potentials for grasshopper, locust and cricket control in your marketing area. Full information on the latest developments is available on request.



R. J. PRENTISS & CO., Inc.

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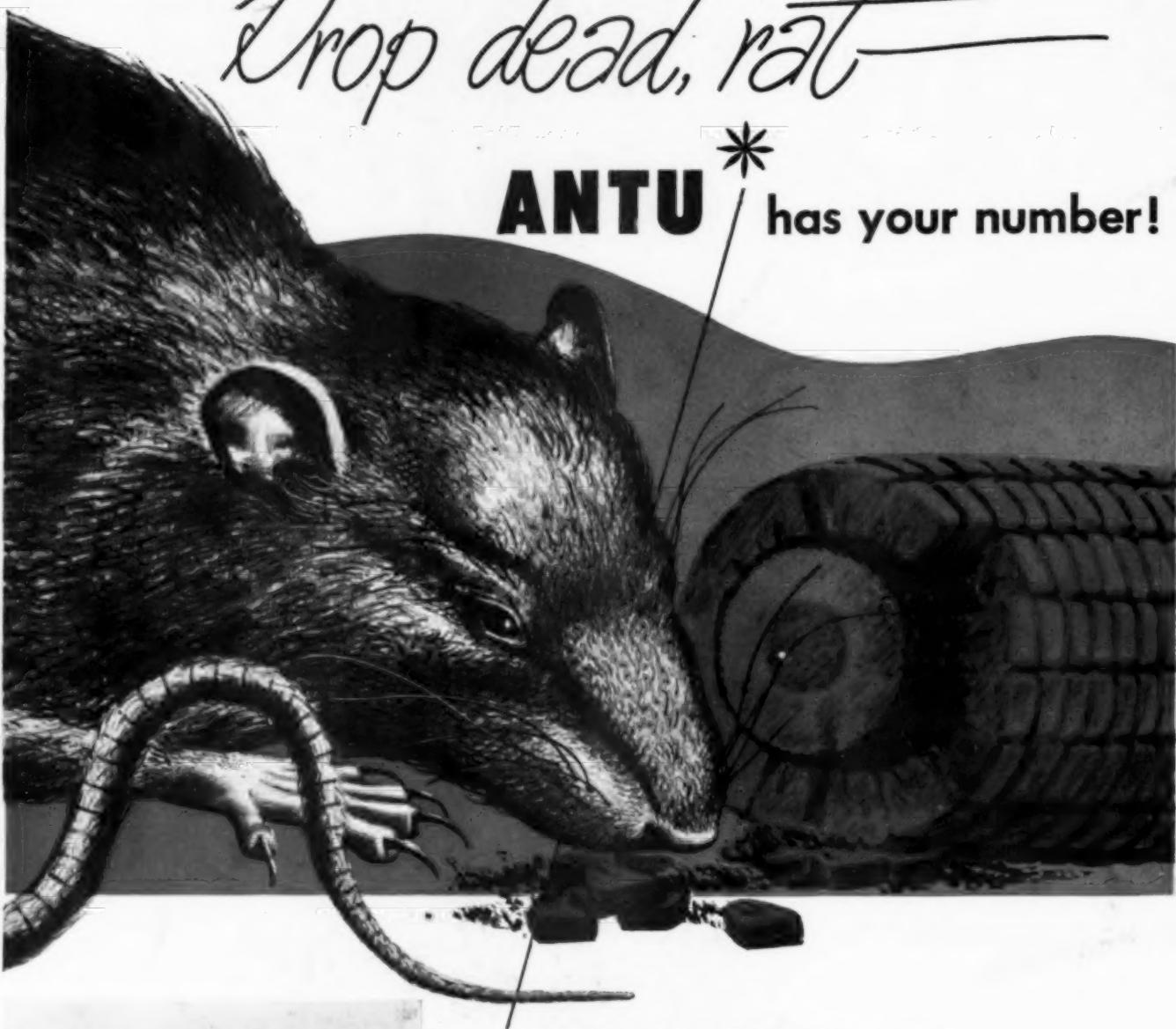
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"Drop dead, rat!"

ANTU* has your number!



* **Alpha-naphthyl-thiourea**

The cunning, disease spreading, property ravaging rat has plagued the world for centuries and defied destruction by mankind until now!

Now, what traps and guns have failed to accomplish, the chemists' newest poison may achieve. For alpha-naphthyl-thiourea, popularly known as ANTU, is proving to be the most deadly baiting and tracking poison yet developed . . . but for all its effectiveness on rats it is less dangerous to animals and humans than previous chemical rat killers.

ANTU is one of the basic products of the Pittsburgh agricultural chemical line, which includes rodenticides, fungicides, insecticides and germicides, all standardized chemically and biologically and available in either technical grade ANTU or 20% dust concentrate.

Requests for further information and quotation are invited.

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DNC (Dinitro Ortho Cresol)
ANTU (Alpha Naphthyl Thiourea)
Chlordane Concentrates
HETP **TEPP** **PARATHION**
(Organic Phosphate Insecticides)
Paradichlorobenzene
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